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ARMOR/ANTI-ARMOR TEAM TACTICAL PERFORMANCE

Thomas D. Scott, Larry L. Meliza, Guthrie D. Hardy, Jr., and James H. Banks
ARI Field Unit, Presidio of Monterey

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sound tactical behavior in planning the attack, initial deployment, use of cover and concealment, surveillance, and use of firepower, regardless of type of unit or mission.

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Tactical Team Performance

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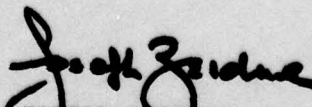
FOREWORD

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has developed a broad program for more effective training of combat units in the Army. The U.S. Army Training and Doctrine Command (TRADOC) has identified small unit tactical engagement simulation training as one of its highest behavioral science research priorities. One product of ARI's research program is a tactical engagement simulation training method known as REALTRAIN that provides extremely realistic and motivating training for small combat arms units. The method is described in ARI Technical Report S-4 and ARI Research Report 1191.

To validate REALTRAIN, ARI has conducted a series of field tests supported by personnel of the ARI Field Unit, Presidio of Monterey, Calif., Jack J. Sternberg, Chief. This report, one of a series, presents part of the findings of an experiment conducted at Fort Carson, Colo., January through March 1978. The core team that planned and executed the validation test, in addition to the authors, consisted of LTC Thomas J. Ritenour and Patrick Whitmarsh of the ARI Field Unit, Presidio of Monterey; E. Robert Clovis and Robert F. Cunningham of Canyon Research Group, Inc.; and LTC Larry Word, TRADOC Systems Manager for Tactical Engagement Simulation (TSM-TES). The authors also acknowledge the assistance of F. H. Steinheiser, Jr., Gary Boycan, Steven Medlin, Bruce Hamill, and Claramae Knerr of the Engagement Simulation Technical Area.

LTC Thomas J. Ritenour of the ARI Field Unit, Presidio of Monterey, contributed outstandingly and was solely responsible for organizing and supervising the military support aspects of the field experiment. This research could not have been accomplished without the support of the 4th Infantry Division (Mechanized). Special thanks are due to the conventional trainer, CPT James L. Prewett of the 4th Division, and the REALTRAIN trainer, MAJ Angelo Severino, Office TSM-TES.

This research was conducted within the December 1976 Five-Year Test Program (FYTP) as approved by the Army Test Schedule and Review Committee (TSARC). The entire program is responsive to the requirements of Army Projects 2Q763743A773 and 2Q763743A780 and the TRADOC TSM-TES of the U.S. Army Training Support Center, Fort Eustis, Va. The research reported here was conducted as part of Army Project 2Q763743A775.


JOSEPH ZEIDNER
Technical Director

ARMOR/ANTI-ARMOR TEAM TACTICAL PERFORMANCE

BRIEF

Requirement:

To identify measures of armor/anti-armor team tactical performance associated with successful performance in an attack mission.

Procedure:

In Phase I, eight tank platoons with attached TOW and forward observer sections from the 4th Infantry Division (Mechanized) at Fort Carson, Colo., engaged in pretest field exercises to establish pretraining performance levels. This pretest included a movement-to-contact/attack against a skilled opposing force (OPFOR).

Phase II provided 5 days of carefully coordinated tactical training, using REALTRAIN methods for four units and conventional methods for four units.

Phase III, the posttest, repeated the pretest on different terrain to establish performance improvement after training.

In Phase IV, test units conducted two meeting engagements against tested units of the other training group (shoot-off exercise).

Findings:

Performances of tested units that accomplished their missions were compared (a) with performances of units that did not and (b) with opposing force (OPFOR) performance during the assault. Findings indicated that performance of successful units was superior to that of unsuccessful units in five major performance categories. Successful units were characterized by sound tactical performance in

- Planning the attack,
- Initial deployment,
- Use of cover and concealment,
- Surveillance, and
- Use of firepower.

During the assault phase of the attack, unsuccessful units could not be evaluated, because these units were rendered ineffective early in the exercises before they could assault the objective. Successful units, however, continued to perform well in the assault phase of the attack. These units continued to use good cover and concealment, frequently detected concealed OPFOR vehicles, employed heavy antitank TOWs to provide effective overwatch for the assaulting tank forces, and were able to mass tank and TOW firepower on the defending OPFOR tanks.

Utilization of Findings:

The findings provide an empirical basis for evaluating the tactical performance of armor/anti-armor teams and for diagnosing unit training deficiencies. In addition, many of the skills central to sound tactical performance identified in this report are common across different missions, echelons, and types of units. These findings have broad implications for the development of improved, more definitive ARTEPs and for the more economical conduct of tactical field training.

ARMOR/ANTI-ARMOR TEAM TACTICAL PERFORMANCE

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ARMOR/ANTI-ARMOR TEAM TACTICAL PERFORMANCE

INTRODUCTION

The improvement of tactical training is one of the Army's highest priorities. In recent years the Army has sought to increase the effectiveness of unit training through the Army Training and Evaluation Program (ARTEP). The major thrust of the ARTEP has been increased emphasis on development of performance-oriented training and evaluation methods. The current ARTEP stresses that unit proficiency be judged on the basis of performance of appropriate missions carried out with as much tactical realism as possible. Further, the current ARTEP attempts to set forth training objectives and standards in explicit performance terms.

As initially implemented, the ARTEP suffered from some critical weaknesses. One weakness was that there was no way to objectively determine terminal mission outcomes. This problem is largely being overcome with the introduction of tactical engagement simulation training methods, such as SCOPES,¹ REALTRAIN, and eventually, the Multiple Integrated Laser Engagement System (MILES). With these methods, commanders can conduct two-sided, free-play tactical exercises with credible casualty assessment and weapons signature effects and a high degree of realism.

A second major weakness of ARTEPs is that the guidance provided is often not adequate to identify specific training requirements. In most cases, if a unit fails to accomplish its mission, the existing guidance is of little help to the trainer in determining reasons for failure. In further ARTEP development, trainers should receive more specific guidance to help them diagnose specific training deficiencies so that the trainers are better able to design an effective, efficient training program.

The Army Research Institute and TRADOC are conducting a research program to improve Army tactical training and evaluation. This program includes the development of tactical engagement simulation training methods, such as REALTRAIN and MILES, and will provide a basis for improving existing ARTEPs. The use of improved ARTEPs and the employment of advanced engagement simulation tactical training methods offer to improve greatly readiness of combat units. Not only will trainers be able to determine objectively the terminal mission outcomes (e.g., mission accomplishment and casualty exchange ratios), but trainers will also be assisted in determining proficiency on critical intermediate tasks (e.g., use of overwatch).

¹ SCOPES: Squad Combat Operations Exercise (Simulation).

Consistent with the performance-oriented, criterion-referenced approach, a critical intermediate task is defined as one that can be shown to increase substantially the probability of mission accomplishment. The steps to identify these tasks are

- a. Identification of candidate intermediate tasks,
- b. Development of objective measures of proficiency for these tasks,
- c. Determination of the test conditions necessary to gather these data reliably,
- d. Correlation of intermediate task proficiency with mission outcomes, and
- e. Identification of tasks that correlate most highly with mission outcomes.

The payoff from this research should be not only the empirical identification and validation of critical intermediate tasks, but also determination of objective measures of task proficiency and measurement procedures that can be incorporated into the ARTEP.

Two field experiments (one with dismounted rifle squads² and one with armor/anti-armor teams³) have compared the relative training effectiveness of REALTRAIN and conventional training methods not employing engagement simulation. The tactical tests used to compare the training methods have been based on current ARTEPs (7-15 and 17-35), but these tests have been greatly expanded to permit detailed analysis of tactical performance. The present paper, one of a series of reports based on these experiments, examines a variety of measures of engagement-related tactical performance for armor/anti-armor teams in the attack. Other reports, such as performance in the defense, will be explored in future papers.

² Banks, J. H., Hardy, G. D., Scott, T. D., Kress, G., & Word, L. REALTRAIN Validation for Rifle Squads: Mission Accomplishment. ARI Research Report 1192, October 1977.

Meliza, L. L., Scott, T. D., & Epstein, K. I. REALTRAIN Validation for Rifle Squads II: Tactical Performance. ARI Research Report 1203, March 1979.

Scott, T. D., Banks, J. H., Hardy, G. D., Jr., & Sulzen, R. H. REALTRAIN Validation for Rifle Squads III: Tactical Performance During Movement-to-Contact. ARI Research Report 1213, July 1979. (a)

³ Scott, T. D., Meliza, L. L., Hardy, G. D., Jr., Banks, J. H., & Word, L. REALTRAIN Validation for Armor/Anti-Armor Teams. ARI Research Report 1204, March 1979. (b)

METHOD

The field experiment consisted of four phases of tactical training and performance testing, repeated in two cycles. Each player unit consisted of a tank platoon, a TOW section, and a forward observer from the 4th Infantry Division (Mechanized) at Fort Carson, Colo.

Phase I was a tactically realistic ARTEP-based pretraining test administered to establish entry-level proficiency and to establish the equivalence of the units to be trained.

Phase II consisted of a 5-day training period during which player units received either REALTRAIN or conventional training.

Phase III was a posttraining test conducted to determine the performance increments resulting from training.

Phase IV consisted of two-sided, free-play exercises in which REALTRAIN and conventionally trained units opposed one another in a meeting engagement.

Pretraining and posttraining tests (Phases I and III) included a movement-to-contact/attack. The scenario for these tests was based on guidance provided in ARTEP 17-35.

Two test lanes were selected so that terrain was as similar as possible and so that tactical realism was maintained. Each unit was administered the pretraining test on one lane and the posttraining test on the other. In addition, order of lane use in pretests and posttests was counterbalanced to minimize any lane effects.

Weapon systems played in the tests were the (M-60A1) tank 105mm main guns, TOW heavy antitank weapons, and 155mm artillery.

Tested units were initially given an operations order that directed them to occupy and secure an objective about 3 km from their attack position. The objective was defended by an opposing force (OPFOR) TOW section located forward of the objective and two OPFOR tanks located on the objective. The test scenario called for the TOW section to withdraw when the lead element of the tested unit closed to within 400 m of the TOW position. The scenario also called for the two OPFOR tanks to remain on the objective until at least one OPFOR tank had been declared a casualty and tanks from the tested unit had closed to within 400 m.

The OPFOR was given 2 weeks of tactical and scenario-specific training before the test to bring the force to a high level of tactical proficiency and to insure that their attacks and defenses during the pretraining and posttraining tests presented a standardized threat. The test conditions presented extremely difficult objectives for the tested units.

After Phase I testing, units were assigned to either REALTRAIN or conventional training on the basis of casualties inflicted and sustained during pretests. Assignments were made so as to insure that training groups, as much as possible, were of equivalent tactical proficiency before training.

Phase II consisted of a 5-day training period during which units received either REALTRAIN training or conventional training. Conventional training was defined in terms of the absence of current engagement simulation techniques. Casualties could be declared by the trainer or umpires on the basis of criteria such as undue exposure of tactical vehicles and force ratios. No umpire was allowed to act in a capacity similar to that of a REALTRAIN controller. Indirect fire was controlled through the trainer, a training noncommissioned officer (NCO), or an umpire; no Fire Direction Center was employed.

Training was given by two highly experienced and accomplished armor officers, one of whom trained the units with REALTRAIN while the other employed conventional methods. Both trainers were given the same training guidance, based on ARTEPs relevant to the missions and test unit composition. Each trainer prepared a 5-day program of instruction (POI). Each POI was reviewed and discussed with the trainer to insure that the two POIs were comparable and that both trainers were training on the same missions, tasks, and conditions.

Phase IV consisted of tactical exercises in which REALTRAIN and conventionally trained units opposed one another in free-play meeting engagements. In each cycle, each unit was scheduled to participate in two exercises, opposing each of the units in the other training group. Two test lanes were used. For a test lane, each unit was independently given a written order from its simulated company team commander that insured that a meeting engagement between the two units would take place. Order of use of the lanes and direction of movement on the lane were counter-balanced for REALTRAIN and conventional units to overcome any potential biasing effects due to terrain characteristics. Engagements continued until all tanks on one side had been destroyed.

RESULTS

Results indicate that unsuccessful units (i.e., units that failed to accomplish their attack mission) tended to sustain very heavy casualties early in the exercise. To determine how unsuccessful units sustained such heavy losses early in the exercise while successful units did not, the portion of the exercise prior to OPFOR TOW withdrawal was extensively analyzed. Findings indicated that successful units performed better than unsuccessful units in five major areas:

- Planning,
- Initial deployment,

- Use of cover and concealment,
- Surveillance, and
- Use of indirect fire.

By the time the OPFOR TOWs were withdrawn, unsuccessful units had suffered devastating losses that rendered them ineffective. Successful units, however, continued to press an effective attack. In this later portion of the attack, performance of successful units was characterized by

- Continued use of good cover and concealment,
- Effective use of TOWs as overwatching elements,
- Massing of firepower on the defending OPFOR tanks, and
- Effective use of tanks as an assault force.

CONCLUSIONS

The present Armor Platoon ARTEP (17-35) does not provide much guidance for trainers to diagnose specific training deficiencies. The data collection methods and measures, discussed in detail in the technical supplement, provide a basis for the development of an improved generation of ARTEPs. Not only are many of the measures discussed here relevant to the improvement of training and evaluation methods for armor/anti-armor teams, but they also may be generalized to larger units (e.g., armor companies). For example, use of overwatch, use of indirect fire, and massing of direct fires are general intermediate processes appropriate for evaluating the tactical performance of higher echelon units.

Moreover, many of these same performance indexes are relevant to different types of units and other types of missions. The generality of these aspects of tactical performance has far-reaching implications for the economical conduct of tactical training. The findings presented in this and earlier reports suggest that there exists a common nucleus of tactical skills that are transferable to other situations and missions. The trainer may be able to train a unit more economically by concentrating primarily on missions requiring the satisfactory execution of the widest variety of these common skills. Thus, the information presented in this report not only constitutes a major step toward the development of an improved generation of ARTEPs, but it also has major implications for the improvement of training management.

TECHNICAL SUPPLEMENT

METHOD

The research was conducted at Fort Carson, Colo., during January, February, and March 1978. Player and support personnel were supplied by the 4th Infantry Division (Mechanized) at Fort Carson. The research was conducted to validate REALTRAIN training methodology and to identify critical measures of tactical performance for armor/anti-armor units.

During the field experiment, eight test units underwent a program of tactical testing and training. Each unit had one tank platoon, one TOW section, and a forward observer. The program consisted of a pretraining test, 5 days of tactical training, a posttraining test, and tactical exercises in which test units trained by different methods opposed one another. Pretraining and posttraining tests were ARTEP-based tactical exercises in which test units performed against a well-trained, controlled opposing force (OPFOR).

Personnel

General. Army test personnel were assigned duty positions based on their qualifications. These personnel included data collectors, controllers, indirect fire personnel, mappers, radio control net operators, training officers and NCOs, and support personnel. Scientific staff members monitored all phases of testing and training to insure that test procedures and scenarios were accurately replicated.

Players and OPFOR. Players were members of eight test units from the 4th Division. Each test unit and the OPFOR consisted of a tank platoon with assigned TOW and forward observer (FO) sections. Once units were established, unit integrity was maintained for the duration of participation in the experiment.

Controllers/Data Collectors. Sixteen individuals (2 officers and 14 enlisted men) acted as REALTRAIN controllers and data collectors aboard tactical vehicles, with one controller/data collector assigned to each vehicle. The two officers were assigned to the platoon leaders' tanks.

During all tests, an O-5 senior tactical controller accompanied the test unit and an O-2 senior OPFOR controller accompanied the OPFOR, each in a 1/4-ton vehicle. Each controller was accompanied by a civilian scientist who was responsible for the scientific execution of trials and the collection of performance data.

Indirect Fire. Eight individuals were responsible for executing the indirect fire missions called by tested units and OPFOR. Four of these manned the Fire Direction Center (FDC) and recorded indirect fire data,

plotted missions, and controlled the fire markers. The remaining four were fire markers and were responsible for placing ground-burst simulators and smoke pots at the locations designated by the FDC.

Mappers. Ten individuals recorded routes and events on 1:25,000 maps. Five mappers were assigned to the tested unit, and five were assigned to the OPFOR. Tested unit and OPFOR mappers were assigned corresponding positions. In each test exercise, one mapper was assigned to each of the two TOWs, one was assigned to the FO, one followed the heavy tank section in a 1/4-ton vehicle, and one followed the light tank section. Heavy and light section mappers were instructed to move so as not to compromise the routes or locations of their section.

REALTRAIN Control Net Operators. Four enlisted men operated the REALTRAIN control net. These operators were responsible for insuring that communications checks were made, recording times of scenario events, transmitting time hacks, recording tactical events (casualties, etc.), and making tape recordings of tactical and control net communications.

Test Staff Training

General. All test staff personnel received intensive training on their duties for at least 1 week and became familiar with the tactical scenario and test lanes. Members of the scientific staff reviewed data forms at the end of practice exercises to insure that the forms were properly completed. The data forms used by controllers and other data collectors were modified in response to feedback provided by data collectors. Numbered checkpoints were placed in the field to assist mappers, controllers, and fire markers.

Data Collectors. Controllers were trained during REALTRAIN mini-exercises and during OPFOR practice sessions for the tactical test. Members of the scientific staff accompanied controllers on tactical vehicles during this training period to facilitate controller training in data collection duties. Mapper data collectors were given extensive training and practice in map reading and in construction of map traces of vehicle routes. Personnel who collected data (casualties, etc.) from the exercise control radio net (NCS) practiced initially on tape-recorded simulated exercises and later on OPFOR practice exercises.

Indirect Fire. FDC personnel and fire markers executed simulated indirect fire missions, and then later executed fire missions during OPFOR practice exercises. Fire markers were given at least 1 week of intensive training and practice. Formal training was given in map reading, land navigation, handling of explosives, and REALTRAIN procedures for indirect fire. In practice sessions, fire markers were given (simulated) missions. Their actual delivery of the requested fire was closely monitored until they demonstrated they could deliver rounds accurately and quickly.

OPFOR. The OPFOR was given 2 weeks of scenario-specific training before the first pretraining test. This training insured that the OPFOR executed its mission in a tactically proficient and standardized manner.

Test Design

Schedule. The field experiment consisted of four phases of tactical training and performance testing, replicated in two cycles. Each cycle consisted of the testing and training of four test units during a 3-week period (see Figure 1). Phase I, the pretraining tests, was carried out over 4 days, one unit being tested each day. The other three units performed maintenance or other duties. Phase II, tactical training, took place over a 5-day period, and all tested units participated each day. Phase III, the posttraining tests, was scheduled the same as Phase I. Phase IV, the shoot-offs, was carried out over a 2-day period with two exercises per day. Each unit was scheduled to participate in two shoot-off exercises, one on each of the 2 days.

Description of Phases. Phases I and III, the pretraining and post-training tests, were ARTEP-based, tactical performance tests. Phase I tests were administered to establish entry-level tactical proficiency, and Phase III tests were given to establish performance gains and final performance levels. Tests consisted of a movement-to-contact/attack followed by a defense. In the general design of the test, the tested units were permitted free-play; the units were constrained only by the tactically realistic orders given them by their simulated company team commander (the senior tactical controller).

The scenario for the OPFOR was carefully constructed to provide standardized measurement and observation opportunities without compromising tactical realism. Two test lanes were used, and each unit was administered the pretraining test on one lane and the posttraining test on the other. The order of lane use in pre- and posttests was counterbalanced to minimize any lane effects. The terrain on these test lanes was quite similar (see Appendix H for a detailed terrain description).

After Phase I testing, units were assigned to either REALTRAIN or conventional training, primarily on the basis of casualties inflicted and sustained during pretests. Assignments were made in such a way as to insure that training groups, as much as possible, were of equivalent tactical proficiency before training began. Appendix F describes the assignment procedures.

Phase II consisted of a 5-day training period during which units received either REALTRAIN training or conventional training. Conventional training was defined in terms of the absence of current engagement simulation techniques. Casualties could be declared by the trainer or umpires on the basis of criteria such as undue exposure of tactical vehicles and

	Week 1					Week 2					Week 3									
Day:	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5					
Activity:	Pretraining tests					Tactical training					Posttraining tests					Shoot-off exercises				
Tactical exercises:	One attack and one defense per day					Determined by trainer					One attack and one defense per day					Two meeting engagements per day				

force ratios. In addition, no umpire was allowed to act in a capacity similar to that of a REALTRAIN controller. Indirect fire was controlled through the trainer, a training NCO, or an umpire; and no FDC was employed.

Training was administered by two highly experienced and accomplished armor officers, one of whom trained the units with REALTRAIN while the other employed conventional methods. Both trainers were given the same training guidance, based on ARTEPs relevant to the missions and test unit composition (see Appendix G). Each trainer prepared a 5-day program of instruction (POI). Each POI was reviewed and discussed with the trainer to insure that the two POIs were comparable and that both trainers were training on the same missions, tasks, and conditions. Conduct of training was monitored to insure that the POIs were followed. As long as the trainers stayed within the generally broad limits of the approved POI, however, they were allowed to adjust their training to meet the particular needs of the units they were training. The same materiel training resources, terrain, and personnel, with the exception of REALTRAIN controllers and equipment, were available to both trainers. Controllers are required for casualty assessment in a REALTRAIN exercise, but not in a conventional training exercise. However, the conventional trainer was provided with a number of umpires to assist in conventional casualty assessment.

Phase IV consisted of tactical exercises in which REALTRAIN and conventionally trained units opposed one another in free-play meeting engagements. In each cycle, each unit was scheduled to participate in two exercises, opposing each of the units in the other training group. Two test lanes were used. For a test lane, each unit was independently given a written order from its simulated company team commander that insured that a meeting engagement between the two units would take place. Test units participated in one exercise on each of the two lanes. Order of use of the lanes and direction of movement on the lanes were counterbalanced for REALTRAIN and conventional units to overcome any potential biasing effects due to terrain characteristics. Once contact had been made, engagements continued until all tanks on one side had been destroyed.

Tactical Test

Attack. In the Phase I and III attack module, a specific terrain area was given to the tested unit as its objective; its mission was to clear the objective of all enemy forces (see Appendix A for operations orders). The tank platoon leader was told that enemy activity had been observed in the vicinity of the objective as well as in a specific area of the terrain forward of the objective. In fact, the forward location was occupied by the OPFOR TOW section, and the objective itself was occupied by two tanks. The positions of the OPFOR permitted use of largely covered and concealed routes of approach by the tested unit during much

of the attack if the units showed good terrain appreciation. The OPFOR TOWs were part of a defense in depth, and the tested unit had to destroy the TOWs or force them to withdraw in order to successfully press the attack on the objective itself.

During the tested units' initial movement-to-contact, only the TOWs were in position to engage elements of the tested unit; the rules of engagement for the test scenario required them to withdraw when test unit tanks closed to within 400 m of their position (see Appendix B for test operating procedures). The scenario for the two OPFOR tanks on the objective required the two tanks to engage the tested unit as soon as possible and to remain on the objective until at least one OPFOR tank had been destroyed and tanks from the tested unit had closed to within 400 m.

Other Exercises. Details of the defenses and meeting engagements are covered in Scott, et al. (1979). Because data derived from these exercises are not discussed in this report, the methods and procedures for defenses and meeting engagements are not covered. A future report will examine tactical performance in the defense.

In Phases I and III, decisions regarding aborted or interrupted trials (see Appendix E) and deviations from the scenario or operating procedures were made jointly by the senior tactical controllers and the civilian scientists.

Casualty Assessment Procedures. Casualties could be produced by (a) the tank main gun (105mm cannon), (b) the TOW heavy antitank weapon system, and (c) indirect fire (155mm artillery). Appendix C contains casualty assessment rules and procedures.

Data Collection

General. A wide range of data was collected during the course of the experiment. Appendix D provides performance data forms. Data collection responsibilities are briefly discussed below. In addition to the performance data collection, scientific staff members maintained logs on any deviation from prescribed procedures and on any unusual factors that might have affected performance or data interpretation.

Tactical Vehicle Controllers. Controller/data collectors on board tested unit and OPFOR vehicles collected information on critical aspects of performance, including use of overwatch, detections, firing events, and use of dismounted TOWs. All data were time-indexed so that they could be compared with data collected from other sources.

Mappers. Time-indexed location and movement data were collected by mappers, who prepared map traces of all tactical vehicle routes. Mappers noted times of halts, starts, and major firing events on their maps.

REALTRAIN Net Control Station (NCS). NCS operators collected engagement and casualty data. NCS personnel also tape recorded and provided short, written summaries of tactical communications among both tested units and the OPFOR. In addition, NCS staff kept a detailed time-indexed log of all scenario-related events. The NCS transmitted times periodically to insure that the various data sources worked from a common time base.

Indirect Fire. Data on indirect fire were collected by the FO data collectors/controllers, FDC personnel, the REALTRAIN NCS, and a civilian scientist. The FO data collector provided information on detections made by the FO, on communications between FO and the other members of the FO's unit, on the FO's location and movement, and on the locations of preplotted targets. The FDC personnel recorded all information on the indirect fire missions called by tested units and the OPFOR. The NCS provided information on casualties resulting from indirect fire missions. The civilian scientist collected data on tested unit indirect fire planning.

Narratives. Upon completion of an exercise, the senior controller, the OPFOR controller, and the principal scientific staff prepared an exercise narrative. Narratives included a detailed reconstruction of events in the exercise and a description of aspects of performance that might not have been recorded on the various data forms. These narrative sessions were tape recorded for subsequent transcription and editing. Appendix I contains a typical narrative.

Ammunition

Direct Fire. Prior to experimental trials, all tanks were equipped with Hoffman devices for simulating the tank main gun weapon signature. Because TOW backblast simulators were in short supply, most trials were executed using hand grenade simulators to simulate the TOW signature. These proved adequate and could be seen clearly from a considerable distance.

For all testing phases, tested units and OPFOR were issued nine Hoffman rounds per tank and eight simulators per TOW. This allotment proved sufficient to execute test phases without the need for ammunition resupply between exercises.

Indirect Fire. During pretests and posttests, the tested unit platoon leader was informed in his operations order that he would be supported by 155mm artillery. Indirect fire HE rounds were simulated by ground-burst simulators. The tested unit platoon leader's ammunition supply rate (ASR) was 49 rounds of high explosive (HE) and 5 smoke missions (at 2 smoke pots per mission). These resources were to be used as needed during both attack and defense missions. Thus, if a unit expended

its 49 rounds of HE during an attack, no rounds would be left for the defense. In practice, this never occurred, and all tested units had sufficient HE rounds remaining at the end of the attack to use indirect fire during the defense.

The OPFOR's ASR was 28 rounds of HE and 3 smoke missions. During the Phase IV shoot-offs, both tested units each had an ASR of 21 rounds of HE and 3 smoke missions. During Phase III (training), each trainer was allotted 300 rounds of HE and 120 smoke pots each cycle to use as he judged best over the 5-day training period. Trainers indicated that this allotment was sufficient.

RESULTS

In a previous report (Scott et al., 1979b) data were presented on mission accomplishment, casualties, and other supporting measures of tactical performance. This paper presents further analyses of these data and is directed toward developing an understanding of the dynamics of armor/anti-armor team tactical performance. Several factors associated with successful performance of armor/anti-armor teams are examined to identify candidate tactical performance measures for further development of the Army Training and Evaluation Program (ARTEP).

The data presented here concern armor/anti-armor team performance in the attack mission. Results are divided into three major sections. In the first section, the mission accomplishment and casualty data presented in the paper cited above are briefly reviewed and events in the early portion of the attack are examined. The second section is concerned with analyses of tactical team performance in the later stages of the attack. The third section presents a brief summary of performance in the attack and discusses implications for the development of ARTEPs.

Section 1: Review and Early Tactical Performance

Mission Accomplishment. Mission accomplishment is the prime goal of any combat unit; it is defined here as securing terrain specified as critical in the tested units' operations orders. In the attack, tested units were required to occupy and clear their objective. This entailed destroying or forcing withdrawal of the OPFOR. Further details are presented in the Methods section and in the operations orders (Appendix A). Both REALTRAIN and conventionally trained units were successful in one attack during pretests. In posttraining tests, REALTRAIN units accomplished their missions in three attack exercises, whereas conventional units accomplished none. Thus, after training, REALTRAIN units had improved more and had attained a higher level of performance in the attack than had conventional units.

Overall Casualties. The numbers of casualties sustained and inflicted are critical measures of a unit's effectiveness and its ability to continue to function effectively. A casualty is defined as a disabled weapon system (tank or TOW) unless specifically otherwise indicated. In general, a weapon system may be disabled by a direct or indirect fire hit or because the entire vehicle crew has been declared personnel casualties. (Appendix D, Casualty Assessment Procedures, gives further details.) Table 1 presents the percentages of casualties sustained and inflicted by tested units in the attack. These data show that in posttests REALTRAIN units substantially reduced the percentage of casualties sustained and increased the percentage of casualties inflicted on the OPFOR. In contrast, conventionally trained units showed no substantial change from pretraining to posttraining tests. It is also clear that both training groups in the pretraining tests and conventional units in the posttest suffered devastating losses. To develop an understanding of the dynamics of these exercises, it is important to determine how these heavy losses were sustained. The following sections will present further analyses of casualty data and examine tactical behaviors associated with sound tactical performance.

Table 1
Percentage of Casualties (Tanks and TOWs) Sustained
and Inflicted by Tested Units in the Attack

Test	Casualties sustained		Casualties inflicted	
	REALTRAIN	Conventional	REALTRAIN	Conventional
Pretest	86	82	6	12
Posttest	63	75	44	6

Early Casualties. In the attack, the OPFOR TOW section occupied a position forward of the objective as part of a defense in depth. The scenario called for these TOWs to inflict any casualties they could and then withdraw to a position from which they could provide overwatch for the defending OPFOR tanks when elements of the tested unit closed on the OPFOR TOW position (see the Methods section for further details). Casualties sustained by tested units before OPFOR TOWs were withdrawn are indicators of how well the tested units conducted the initial phase of the attack.

Table 2 presents the percentage of casualties sustained by tested units before TOW withdrawal. During pretests, about two-thirds of all tested units' weapons systems were destroyed early in the exercise. In posttests, REALTRAIN units showed a substantial improvement, reducing the percentage of casualties sustained from 61% to 22%. Conventionally trained units, however, showed a considerably smaller improvement, reducing their percentage of casualties sustained from 68% to 54%. These data indicate that, after training, conventional units were more likely to be rendered ineffective early in the engagement than were REALTRAIN units. The REALTRAIN units, however, were more likely to survive the early stages of the attack exercises with sufficient forces intact to enable them to carry out an effective attack.

Table 2
Percentages of Tested Unit Tanks and
TOWs Declared Casualties Prior
to OPFOR TOW Withdrawal

Test	REALTRAIN	Conventional
Pretest	61	68
Posttest	22	54

Success in Engagements. The analyses presented above have compared REALTRAIN and conventionally trained units. However, the primary goal of this report is to identify candidate measures of tactical performance for use in developing improved engagement-simulation-based ARTEPs. Therefore, to more clearly define the ingredients of sound tactical performance, it is useful to compare the behaviors of units that performed well in the attack with those that did not. The following analyses then, will emphasize differences between successful and unsuccessful performances in the attack. Success, as defined here, indicates that the exercise outcome was "mission accomplished." Tested units were successful in 5 exercises and unsuccessful in 11. To show the relationship between the two data sets, Table 3 presents the percentages of casualties sustained by tested units before OPFOR TOW withdrawal and for the entire attack exercise. Results are presented for REALTRAIN and conventional units (posttest) and are compared with successful and unsuccessful exercise outcomes.

Table 3

Percentages of Casualties Sustained in the Posttest,
by Training Group and Outcome

Unit	Before OPFOR TOW withdrawal	Total exercise
Training group		
REALTRAIN	22	63
Conventional	54	75
Exercise outcome		
Successful (N = 5)	11	51
Unsuccessful (N = 11)	70	88

Note. Data are presented for the period prior to OPFOR TOW withdrawal and for the total attack exercise.

As expected, these data show that the differences in casualties sustained between REALTRAIN and conventional training groups are smaller than those found when considering the data in terms of successful and unsuccessful outcomes. REALTRAIN units suffered more casualties than successful units, and conventional units suffered fewer casualties than unsuccessful units. Using successful and unsuccessful exercise outcomes as the principal basis of analysis will help determine the ingredients of sound tactical performance and develop candidate measures of unit tactical performance for engagement-simulation-based ARTEPs.

Success and Early Casualties. The ability of a unit to continue to attack effectively depends partially on the total number of weapon systems available. Perhaps more important, however, is the number of surviving tanks, because lightly armored TOWs cannot continue to attack unsupported. In addition, sound command and control is a critical aspect of any tactical operation. Frequently, when leaders are lost, units cease to function in an integrated fashion and become more vulnerable.

The data presented in Table 4 show that unsuccessful units lost nearly three-quarters of their tanks and leaders (platoon leaders and platoon sergeants) prior to OPFOR TOW withdrawal. With little leadership and with little "heavy armor," it is clear that these units would have a poor chance of mounting an effective attack. In successful attacks, on the other hand, units suffered leader and tank losses of 10% and 16%, respectively. Thus, successful attacks were characterized by a low initial tested unit casualty rate. These data underscore the criticality of the early portion of the attack exercises.

Table 4

Early Casualties: Percentages of Tested Unit
Casualties Sustained in the Attack Prior to
OPFOR TOW Withdrawal

Unit	Type of casualty		
	Tank	Leader	Tank & TOW
Successful	16	10	11
Unsuccessful	74	73	70

Temporal Distribution of Casualties. Temporal characteristics of engagements may reveal important information about the patterns of combat. In the present context, the manner in which casualties were distributed over time shows differences between successful and unsuccessful units. These differences suggest reasons why some units accomplished their missions and others did not. Figure 2 presents the cumulative distributions (over time) of successful and unsuccessful units' tank and TOW casualties. Not only did unsuccessful units sustain heavy losses prior to OPFOR TOW withdrawal, but these units also began to sustain a high rate of casualties shortly after crossing the line of departure (LD). After the first 20 minutes of the exercise, unsuccessful units suffered 26% casualties, compared with 3% for successful units. Because the OPFOR TOWs positions were 2,000 m or more from the LD, these early engagements probably occurred at fairly "long" ranges. Moreover, it is at these fairly long ranges that tested units should have been most difficult to detect. The data, then, suggest that unsuccessful units did not employ sound movement techniques, and that the poor quality of unsuccessful units' movement techniques became evident shortly after they had crossed the LD.

Planning and Preparation. The high frequency of very early unsuccessful unit casualties suggests that these units may not have been adequately prepared to execute their missions. Planning and coordination are essential aspects of any tactical operation. Data on planning show that unsuccessful unit leaders did not plan to provide a great deal of protection for their elements in the early portion of the exercise, nor did they communicate their plans effectively to their elements. Forty-one percent of the unsuccessful units' tank and TOW crews were not briefed on the contents of the platoon leaders' orders, compared with 17% of the successful units' crews. Thus if an unsuccessful unit vehicle commander was declared a casualty, the crew would be less likely to have adequate information on how to proceed than would a successful unit crew.

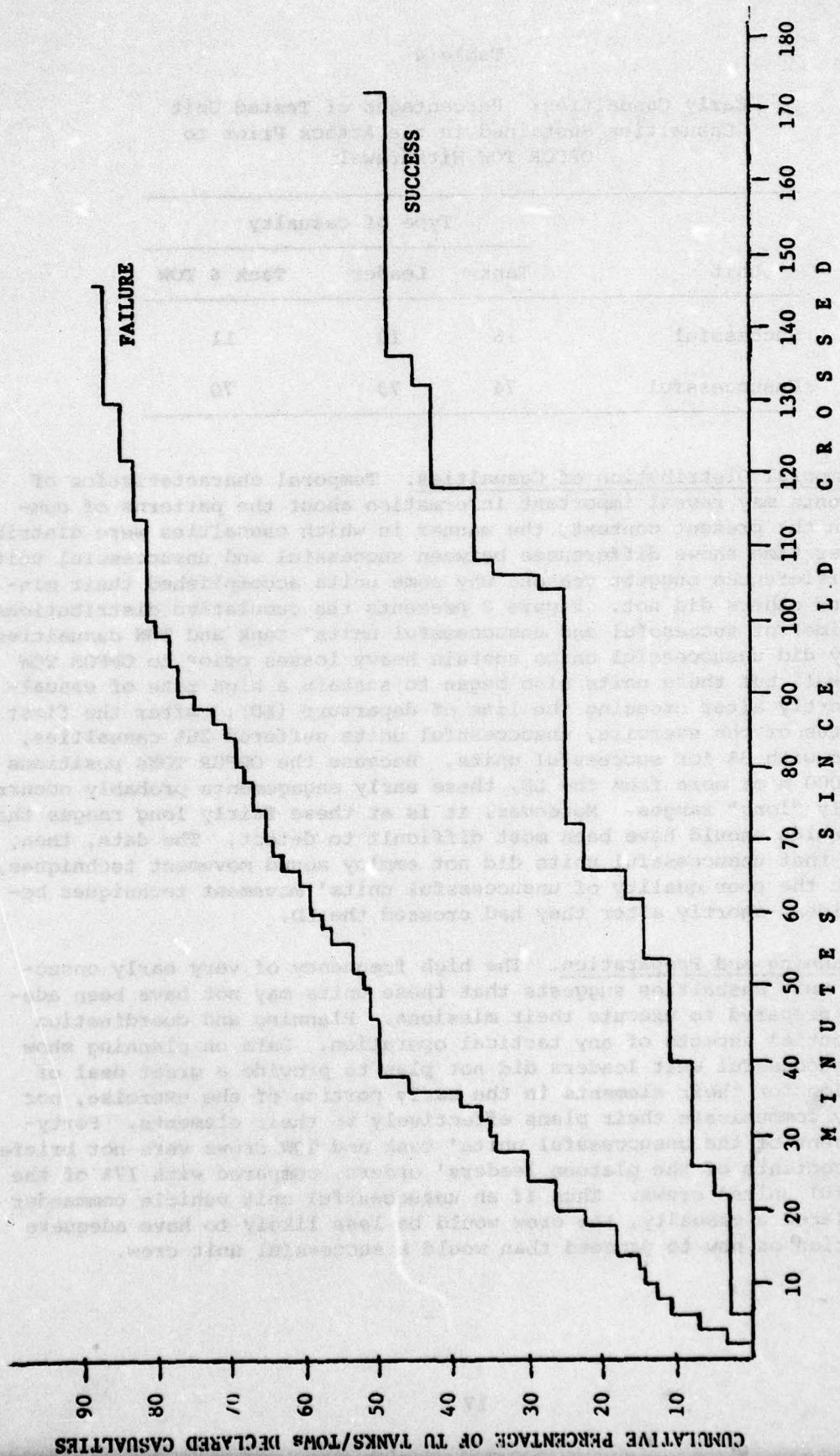


Figure 2. Cumulative percentage of tested unit tanks and TOWs declared casualties as a function of time from crossing the Line of Departure (LD).

In addition, successful units planned to provide protection for their maneuvering elements as they crossed the LD to a greater extent than did unsuccessful units. All of the successful unit leaders planned to use indirect fire to cover their initial movement across the LD, compared with 27% for the unsuccessful units. Also, 80% of the successful units placed at least one of their TOWs in a position to provide overwatch as the maneuvering tank forces crossed the LD, compared with 55% of the unsuccessful units. Even though unsuccessful tested units did not use the terrain to their advantage in their initial deployment (as shown by the high percentage of casualties in the first 20 minutes of the exercise), placing TOWs in an overwatch position could have allowed them to return the OPFOR TOW fire and inflict casualties on the OPFOR.

Sound planning was not limited to the crossing of the LD. Successful units also planned to provide continuing overwatch for their maneuvering tanks to a greater extent than did unsuccessful units. Eighty percent of the successful units planned to displace their TOWs forward to support the assault on the objective. In contrast, 45% of the unsuccessful units planned to move their TOWs forward for the assault. These data indicate that successful units were better prepared to execute their mission than were unsuccessful units.

Early Indirect Fire. One way that tested units could have decreased the likelihood of being detected or engaged early in the exercise was to use indirect fire (IDF) either to suppress the OPFOR or to conceal their movements by using smoke screens. Table 5 presents the percentages of units employing IDF in the early portion of the exercise. Sixty percent of the successful units used smoke or high explosive (HE) to cover their units within 10 minutes of the time their first track vehicle crossed the LD, compared with 27% of the unsuccessful units. Thus, successful units were more than twice as likely to use their IDF resources to cover their initial deployment as were unsuccessful units.

Table 5
Percentages of Tested Units That Used Early Indirect Fire

Unit	Used smoke or HE at LD	Used smoke before TOW withdrawal	Used HE before TOW withdrawal
Successful	60	80	80
Unsuccessful	27	45	45

In addition, successful units were more likely to use IDF between the time they crossed the LD and the time the OPFOR TOWs were withdrawn. Eighty percent of the successful units employed HE, and 80% used smoke during this period, compared with 45% of unsuccessful units for each type of IDF mission. Also, prior to OPFOR TOW withdrawal, successful units called for an average of 2.4 IDF missions, compared with an average of 1.4 missions for unsuccessful units. Thus, successful units made better use of their IDF resources than did unsuccessful units in that successful units (a) were more likely to use IDF to cover their initial deployment, (b) were more likely to use both smoke and HE type missions, and (c) called a greater average number of supporting indirect fire missions.

Cover and Concealment. How unsuccessful units came to sustain such heavy casualties may be partially determined by their use of cover and concealment. In addition to the temporal casualty data, informal observation and narrative data also suggest that unsuccessful units often exposed themselves unnecessarily and were generally careless about their use of the terrain. Empirical data support this suggestion.

Table 6 presents the mean number of times tested unit elements were detected and identified by the OPFOR before OPFOR TOW withdrawal. Overall, unsuccessful units were detected and identified more than three times as often as were successful units. The high frequency of detection indicates a generally poor use of terrain by unsuccessful units. Table 6 also shows the mobility condition of the tested unit vehicles when they were detected and identified. Unsuccessful units' vehicles were detected while moving nearly twice as often as were successful units' vehicles. These data suggest that successful units selected more covered and concealed routes of advance and moved more carefully than did unsuccessful units.

Table 6

Use of Cover and Concealment: Mean Number of
Times Tested Unit Elements Were Detected
and Identified by the OPFOR in the
Attack Prior to OPFOR TOW Withdrawal

Unit	Vehicles detected and identified		
	Moving	Stationary	Total
Successful	2.8	0.2	3.0
Unsuccessful	5.2	4.6	10.3 ^a

^a Some detections were not designated as detections of moving or stationary vehicles.

Stationary Detections. The results show an even more striking difference between successful and unsuccessful units' vehicles detected while stationary (Table 6). Successful units' stationary vehicles were rarely detected; however, unsuccessful units' vehicles were detected while stationary more than four times each exercise, nearly as often as their moving vehicles were detected. These data suggest that successful units selected and employed positions that were more covered and concealed from the OPFOR than did unsuccessful units.

It should be noted that the large difference in stationary tested unit vehicles detected was not due to the unsuccessful units stopping more frequently than successful units. Each unsuccessful unit vehicle stopped an average of 7.6 times prior to OPFOR TOW withdrawal, compared with 7.0 times for successful units. Nor did unsuccessful units provide the OPFOR a better opportunity for detection by remaining stopped for longer periods of time. Between the time tested units crossed the LD and the time the OPFOR TOWs were withdrawn, unsuccessful units spent an average of 17.4 minutes stopped, compared with 22.2 minutes for successful units.

Multiple Detections. In addition, informal observation and narrative data suggested that some of the differences in detection frequencies of successful and unsuccessful units' vehicles were due to multiple detections (i.e., detections of two or more vehicles made by an OPFOR crew at approximately the same time). Unsuccessful units' tanks and TOWs were detected and identified in at least one multiple detection event before OPFOR TOW withdrawal in 91% of the attack exercises, compared with 60% for the successful units. Moreover, unsuccessful units' track vehicles were involved in multiple detections by the OPFOR an average of 2.8 times per exercise before OPFOR TOW withdrawal, compared with 0.8 times for successful units. These data indicate that events in which the OPFOR detected two or more vehicles were more pervasive among unsuccessful units than successful units; these data also suggest that unsuccessful units may not have been maintaining adequate dispersion among their vehicles.

Use of Observation Posts (OPs). Detections of stationary targets are particularly critical, because detected stationary vehicles are likely to remain in view of the OPFOR for a longer time than are moving vehicles and are thus more easily engaged. One way a unit might minimize detections of its stationary vehicles is to stop in fully covered or concealed positions and to deploy crew members forward as OPs, rather than to attempt selection of positions where the vehicle is in partial defilade (and thus partially exposed). The employment of OPs has two major advantages for the tested units. First, personnel targets are smaller and therefore are not as easily detected. Second, where an OP can easily change positions to gain a better view of the critical terrain without providing the OPFOR with major detection cues, vehicular targets are often detected while adjusting their positions because of dust, engine smoke, or noise. Results show that successful units were about 50% more likely to employ OPs than were unsuccessful units. Successful units employed OPs

an average of 8.0 times prior to OPFOR TOW withdrawal, compared with 5.4 times for unsuccessful units. Therefore, the more frequent use of OPs by successful units is probably a major factor in their low stationary detection frequency and in their ability to survive the early portion of the engagement.

Use of Dismounted TOWs. A similar point regards TOW employment. Dismounted TOWs are generally more easily concealed and thus may be more difficult to detect and engage than vehicle-mounted TOWs. In this case, of all the TOWs declared casualties during the attack, 25% were ground-mounted and 75% were vehicle-mounted. Also, prior to OPFOR TOW withdrawal, unsuccessful unit TOW casualties were sustained primarily by vehicle-mounted weapons (77%) as opposed to ground-mounted weapons (23%). Successful units, which sustained only one TOW casualty before OPFOR TOW withdrawal, had a greater tendency to ground-mount at least one of their TOWs than unsuccessful units had. Fifty percent of the successful units' TOWs were ground-mounted at least once prior to OPFOR withdrawal, compared with 36% for the unsuccessful units.

Thus, it is likely that in these exercises TOW survivability was enhanced by ground-mounting the weapon system. These data are consistent with the cover and concealment data presented earlier (Table 6) and suggest that if TOWs are to be employed in a static mode, ground-mounted employment of these weapons offers a substantial advantage.

TOW Employment. It should be noted, however, that although a ground-mounted TOW is, in general, less easily detected than a vehicle-mounted weapon, it is also less mobile. It may be tactically advantageous, therefore, to ground-mount one of the two TOWs and leave the other vehicle-mounted so that it can be easily displaced to overwatch the forward tank elements. Table 7 presents the percentage of units that ground-mounted none, one, or both of their TOW weapons. All successful units ground-mounted one TOW and left the other free to maneuver. Most unsuccessful units (55%), in contrast, did not ground-mount either of their TOWs. Of those units that did ground-mount their TOWs, most ground-mounted both weapons. In this latter case, units had little flexibility in weapon system employment.

Clearly, the optimal mode of employment depends on the tactical situation. The central point here, however, is not the mix of ground- and vehicle-mounted weapons used by tested units per se, but rather the capability of the unit leaders to use their TOW weapon system to maximize the effectiveness and the flexibility of their tactical resources. The results suggest that successful units tended to make better use of their available resources in this regard than did unsuccessful units.

Table 7

Percentage of TOW Units Which Ground-Mounted None, One, or Both TOWs Prior to OPFOR TOW Withdrawal

Unit	Ground-mounted TOWs		
	None	One	Two
Successful	0	100	0
Unsuccessful	55	18	27

OPFOR: Casualties and Detections. Although it was critical that a unit survive the early portion of the exercise with sufficient firepower intact to enable it to carry out an effective attack, the unit's mission was to seize and occupy an objective. This required tested units not only to take measures to protect themselves but also to acquire enemy targets and bring them under fire or force their withdrawal.

Table 8 presents the mean number of times OPFOR vehicles were detected and identified and the percentage of the OPFOR declared casualties prior to OPFOR TOW withdrawal. These data show that the OPFOR was rarely detected and rarely taken under fire by either successful or unsuccessful units during the early portion of the exercise. The low detection frequency is not surprising, because OPFOR TOW positions were carefully selected to provide the maximum possible concealment from the tested units consistent with the requirements for good fields of observation and fire. Also, the OPFOR tanks were placed in well-concealed positions that were generally out of the line of sight of the tested units until they had nearly closed on the OPFOR TOW position. Most (90%) of the detection and firing events involving OPFOR targets occurred following OPFOR TOW withdrawal. Events occurring after OPFOR TOW withdrawal are examined in Section 2 of this report.

Summary. This section has described the performance of tested units in terms of a variety of measures of tactical proficiency. Yet none of these performances, taken separately, determines mission outcome. Weapon system employment, tactics, and command and control all play key roles in sound tactical performance. If the key measures discussed in this section jointly determine mission outcome, pooled performances should discriminate between successful and unsuccessful units and be positively correlated with mission accomplishment.

Table 8

Mean Number of Times OPFOR Tanks and TOWs Were
Detected and Identified and Percentage
of OPFOR Declared Casualties Before
OPFOR TOW Withdrawal

Unit	Mean detections of OPFOR	OPFOR casualties (%)
Successful	1.2	5
Unsuccessful	0.8	0

Table 9 presents 11 performance measures pooled to form an overall performance index for the period of time from delivery of the company team commander's order to the platoon leader until the OPFOR TOWs were withdrawn. One point was given in each exercise for each of the activities specified in Table 9. Successful units were scored positively on an average of 8.4 measures, compared with 3.8 measures for unsuccessful units ($t = 4.58; p < .001$). Moreover, a point-biserial correlation indicates a strong positive relation between the pooled performance scores and mission accomplishment ($r_{pb} = 0.77; p < .001$). Thus, the measures discussed in this section provide an empirical basis for the development of improved, performance-oriented ARTEPs.

Section 2: Performance in the Assault

General. The previous section examined factors associated with tested unit survival in the early portion of the attack exercises. This section will discuss performance in the later portion of the attack, following OPFOR TOW withdrawal. It will be recalled that unsuccessful units had sustained 70% casualties before the OPFOR TOWs withdrew, and at that point in the exercise they had little chance of mounting an effective attack. Therefore, unsuccessful unit performance will not be examined here, except to note that after OPFOR TOW withdrawal, these units sustained an additional 18% casualties (for a total of 88% casualties sustained) and inflicted no casualties on the OPFOR.

Table 9

**Measures Pooled to Yield Overall Performance Index
(Prior to OPFOR TOW Withdrawal)**

A. PLANNING

1. All crews are briefed on contents of platoon leaders' orders.
2. Units plan to cover initial deployment with indirect fire.
3. Units plan to move TOWs forward to cover assault on the objective.

B. INITIAL DEPLOYMENT

1. At least one TOW in overwatch as unit crosses LD.
2. Unit calls indirect fire to cover initial deployment.

C. COVER AND CONCEALMENT

1. Unit tanks and TOW are detected and identified less than five times.
2. No multiple detections are made of units' tanks and TOWs.
3. OPs are employed at least three times.
4. At least one TOW is ground-mounted.

D. SURVEILLANCE

1. OPFOR is detected and identified at least once.

E. FIREPOWER

1. Indirect fire is employed before OPFOR TOW withdrawal.
-

In the following analyses, successful unit performances are compared, as appropriate, with OPFOR performance. In this context, several factors should be noted. First, the OPFOR had received more extensive training than had any of the tested units; they had received nearly 2 weeks of scenario-specific and tactical training prior to experimental trials. Also, the OPFOR was considerably more familiar with the terrain on which tactical tests were conducted because training had been conducted on the actual test lanes. Tested unit training areas, in contrast, overlapped only slightly with test lanes and not at all with the area containing forward TOW positions or objectives. The OPFOR, then, was a well-trained unit and could be expected to provide competent and demanding opposition to the tested units.

In addition, the OPFOR was generally aware of the routes of advance available to the tested units because of its extensive practice on the test lanes. Finally, the OPFOR positions (initial tank positions on the objective and OPFOR TOWs' secondary [withdrawal] overwatch positions) provided good concealment and good fields of fire. Thus, the OPFOR provided a strong defense by virtue of its extensive training, its familiarity with the terrain and knowledge of probable tested unit routes of advance, and by virtue of the positions it occupied.

Therefore, in interpreting the data that follow it is important to bear in mind that tested units had to overcome a substantial resistance to accomplish their missions. Moreover, because of the natural advantage of the defender in this attack mission (i.e., the attacker must advance on his objective, whereas the defender has the option of maneuvering or remaining stationary as the situation dictates), attacking forces could not reasonably expect to achieve parity in the numbers of casualties exchanged. Given the approximately 2:1 force ratio and the difficulty of the attack mission, however, more or less similar proportions of casualties would indicate sound tactical performance by the tested units. Cases in which tested unit and OPFOR performance scores are equivalent or similar can be safely interpreted as indicating sound tactical performance on the part of the tested units.

Assault Casualties. Table 10 presents the percentages of casualties sustained after OPFOR TOW withdrawal by the OPFOR and by successful units. Note that data on casualties inflicted are not presented, because the casualties sustained by the OPFOR were inflicted by the successful units, and vice versa. These data show that successful units and the OPFOR performed about equally well in terms of the percentages of casualties sustained and inflicted, both in the period after OPFOR TOW withdrawal and over the entire exercise. Both sustained about 50% casualties during the attack, and most of these casualties were sustained during the assault. Because the OPFOR was considered to be a relatively well-trained unit (see above), these casualty data suggest that the successful units performed well in the attack.

Casualty Type. Table 11 presents the OPFOR and successful unit percentages of casualties sustained after OPFOR TOW withdrawal by vehicle type. Successful units sustained 52% tank casualties, compared with 90% OPFOR tank casualties. Recalling that the OPFOR was not allowed to displace its tanks from the objective until one tank had been declared a casualty and that the successful unit-to-OPFOR-force ratio was approximately 2:1, the outcome is as would be expected for two well-trained opposing units. Moreover, the 90% OPFOR tank casualties indicate that most of the successful tested units destroyed both the defending OPFOR tanks rather than simply forcing a withdrawal.

Table 10

Percentages of Successful Unit and OPFOR Tanks
and TOWs Declared Casualties After OPFOR TOW
Withdrawal and During Entire Attack Exercise

Unit	Casualties sustained	
	After OPFOR TOW withdrawal	During entire exercise
Successful	40	51
OPFOR	45	50

Table 11

Percentages of OPFOR and Successful Units
Tanks and TOWs Declared Casualties
Following OPFOR TOW Withdrawal,
by Vehicle Type

Unit	Type of casualty		
	Tanks	TOWs	Total
Successful	52	10	40
OPFOR	90	0	45

The casualty data also show that neither side sustained a large percentage of TOW casualties. Because the OPFOR TOWs had been withdrawn to well-concealed overwatch positions to the rear of the objective, the absence of OPFOR TOW casualties is not particularly surprising. The low frequency of successful units' TOW casualties, however, requires further analysis to determine the role these TOWs played in the later portion of the attack exercise.

Detections. As was shown in Section 1, successful units used cover and concealment well prior to OPFOR TOW withdrawal. Table 12 presents the mean numbers of successful unit and OPFOR tanks and TOWs detected and identified following OPFOR TOW withdrawal. These data are fully consistent with the casualty data presented above and the detection data presented in Section 1. OPFOR and tested unit tanks were detected with similar frequencies, again showing that tested units maneuvered skillfully against the OPFOR. OPFOR and successful unit TOWs were rarely detected following OPFOR TOW withdrawal. Thus, one explanation of the low successful unit TOW casualty frequency is that these TOWs employed good cover and concealment during the later portion of the attack.

Table 12

Mean Number of Tanks and TOWs Detected
and Identified After OPFOR TOW
Withdrawal and During Entire
Exercise

Unit	After TOW withdrawal		Total exercise	
	Tanks	TOWs	Tanks	TOWs
Successful	4.6	0.2	6.8	0.6
OPFOR	4.0	0.2	4.4	1.0

TOW Overwatch. Although it was necessary for the successful unit TOWs to minimize their vulnerability by good use of cover and concealment, it was also critically important for the TOWs to provide overwatch for the assaulting tank force. The successful tested units consistently used their TOWs to provide the necessary overwatch. The data show that all successful units used at least one TOW in overwatch during the later portion of the attack. Moreover, during 84% of the exercise time after OPFOR TOW withdrawal, at least one of the successful units' TOWs attempted to provide overwatch for their tank forces.

Firepower. Although the attempt to provide overwatch by the TOWs shows an appreciation by successful units for sound tactical employment of their TOW weapon systems, the quality of the overwatch provided may be determined from the ability of the TOWs to directly support the assault on the objective. Table 13 presents the percentages of the weapons systems declared casualties that were inflicted by the OPFOR and successful units. Both OPFOR and successful unit TOWs inflicted about 20% casualties in the later portion of the exercise. Successful unit TOWs

engaged all of their OPFOR targets at 2,000 m or more. This suggests that these TOWs had taken up overwatch positions well to the rear of the assaulting tank force. Moreover, judging from the casualties inflicted on the OPFOR, the position afforded them good fields of fire. From these data, it can be shown that the successful units' TOWs not only attempted to provide overwatch, but that they also did so effectively, accounting for 40% of the casualties sustained by the OPFOR (or 20% of the total OPFOR weapon systems).

Table 13

Percentages of Weapons Systems Declared Casualties
in OPFOR and Successful Units After TOW Withdrawal
and for Entire Exercise, by Inflicting
Weapon Systems

Casualties inflicted	OPFOR casualties		Successful unit casualties	
	After TOW withdrawal	Total	After TOW withdrawal	Total
By tanks	25	25	20	20
By TOWs	20	20	17	26
By 155mm artillery (indirect fire)	0	5	3	6

Tested unit tanks inflicted 25% casualties on the OPFOR, compared with 20% casualties inflicted by the OPFOR tanks on tested units (Table 13). Engagement range data indicate that all the casualties inflicted by the tested units occurred at less than 1,000 m; that is, as the tested units mounted their final assault on the objective. Similarly, 86% of the casualties inflicted by the OPFOR tanks occurred at less than 1,000 m. These data suggest that tested units continued to use good cover and concealment, as they had during the early portion of the exercise, until they had nearly closed on the objective. Thus, the tested units prevented the OPFOR from engaging them at maximum range, and they also had an ample opportunity as they approached the objective to determine OPFOR location and strength before fully committing their forces. The final stage of the attack was characterized by generally short-range engagements by the two opposing tank forces, supported by longer range engagements by the overwatching TOWs. During the assault, the firepower of successful unit and OPFOR TOW forces was directed at the tank forces

fighting on the objective. Because both tanks and TOWs in tested units inflicted heavy damage on the OPFOR, it is clear that tested units effectively focused their firepower on the forces defending the objective.

Summary. The data presented in this section have shown that successful tested units performed at least as well as did the OPFOR following OPFOR TOW withdrawal. Successful units and the OPFOR exchanged similar percentages of casualties and detected one another with similar frequencies. Successful units used their TOWs as overwatching elements for their tank forces, and the TOWs were quite effective in this role, accounting for 40% of the OPFOR casualties. Successful unit tank forces employed as maneuvering elements used good movement techniques and were the main assault force. Successful unit tanks and TOWs concentrated their combined firepower on the defending OPFOR tanks during the assault. These aspects of successful tested unit tactical performance indicate a forceful and skillful execution of their assigned mission. Units not only showed their maneuver skills, but also showed a sound appreciation of and ability to coordinate their elements for a concerted attack on a defended objective.

Section 3: Summary and Conclusions

This report has presented an analysis of the tactical performance of armor/anti-armor teams in an attack mission. Results were presented in two sections. The first covered performance in the early portion of the attack, before OPFOR TOW withdrawal; the second examined performance following TOW withdrawal. The purpose of these analyses was to identify tactical behaviors associated with successful performance.

Table 14 shows tactical behaviors that characterized successful performance. These behaviors cover five major performance areas: planning, initial deployment, cover and concealment, surveillance, and firepower. Although these areas are not exhaustive (for example, communications has not been included), they do provide important information on critical areas of tactical performance of armor/anti-armor teams in the attack. Moreover, the tactical behaviors discussed above can provide trainers with a basis for evaluating the performance of their units and for diagnosing training deficiencies.

Current ARTEPs focus the evaluation most heavily on terminal products; they often do not provide substantial guidance to trainers on critical performances during movement or engagements. Incorporation of new measures of engagement-related tactical performances is essential for the improvement of performance-oriented training and evaluation. Product-oriented measures, such as casualties, are affected by a large number of factors in addition to the unit's training status. These factors include mission and situation, weather, terrain, relative combat power, skill of the opposition force, and chance events. Consequently, such measures of performance are not, by themselves, reliable or valid indexes of the capabilities of a unit. (Given sufficient standardized

replications, as in the present test, product-oriented measures can be useful for determining average tactical proficiency of a number of units.) Terminal product measures must be supplemented by measures of critical tactical processes to permit more adequate evaluation, accurate diagnosis of training deficiencies, and efficient conduct of remedial training. Some of these critical tactical processes for armor/anti-armor teams and possible measurement procedures are identified by the analyses presented in this and earlier reports. Others will be identified in future papers.

Table 14

**Tactical Performances Associated With Success
in the Attack Exercises**

A. PLANNING

1. All crews are briefed on contents of platoon leaders' orders.
2. Unit plans to cover initial deployment with indirect fire.
3. Unit plans to move TOWs forward to cover assault on the objective.

B. INITIAL DEPLOYMENT

1. At least one TOW is in overwatch as unit crosses LD.
2. Unit calls indirect fire to cover initial deployment.

C. COVER AND CONCEALMENT

1. Unit minimized being detected by enemy forces.
2. Unit is not detected in groups.
3. Vehicles use OPs to minimize risk of being detected.
4. TOWs are ground-mounted to minimize risk of being detected.

D. SURVEILLANCE

1. Unit maximizes detections of enemy forces.

E. FIREPOWER

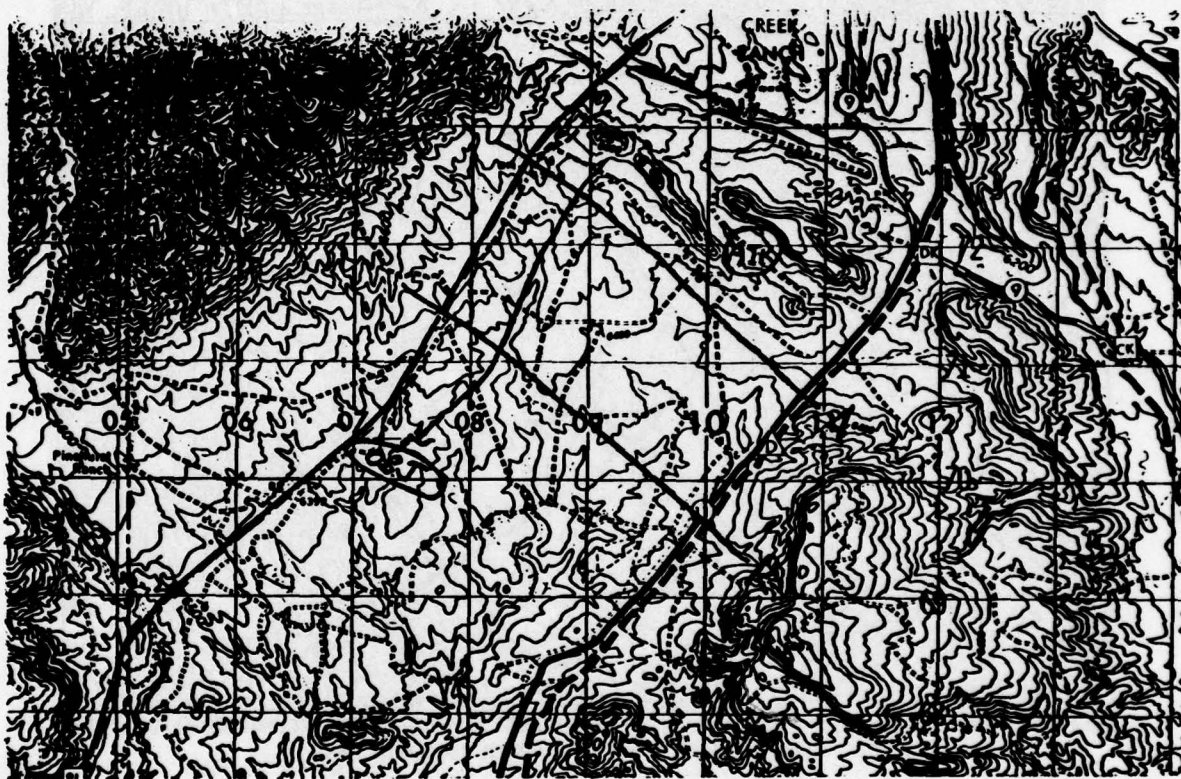
1. Unit employs indirect fire resources.
 2. TOWs provide effective overwatch for friendly elements.
 3. Unit focuses firepower on critical areas.
-

The findings presented in this paper indicate that successful units tended to perform well consistently throughout the attack exercise. For example, these units scored well consistently on overwatch items in terms of planning, initial deployment, and the proportion of the exercise time overwatch was being provided. In addition, successful units scored well across a variety of different types of performance measures (e.g., use of indirect fire, use of cover and concealment, surveillance). Together with the results presented in previous reports (Banks et al., 1977; Meliza et al., 1979; Scott et al., 1979a), the findings suggest that many of these skills are "universal"; that is, they are required for sound tactical performance across a number of different missions and even for different types of units. These findings have important implications for the economy of training. A trainer need not train his unit on all missions, but rather can concentrate on priority missions that require execution of "universal" skills.

Before these benefits can be realized, however, the trainer must be able to measure what skills a unit possesses and what additional training it requires. This guidance can best be provided by improved ARTEPs that incorporate more specific, objective, and valid measures of unit effectiveness.

APPENDIX A

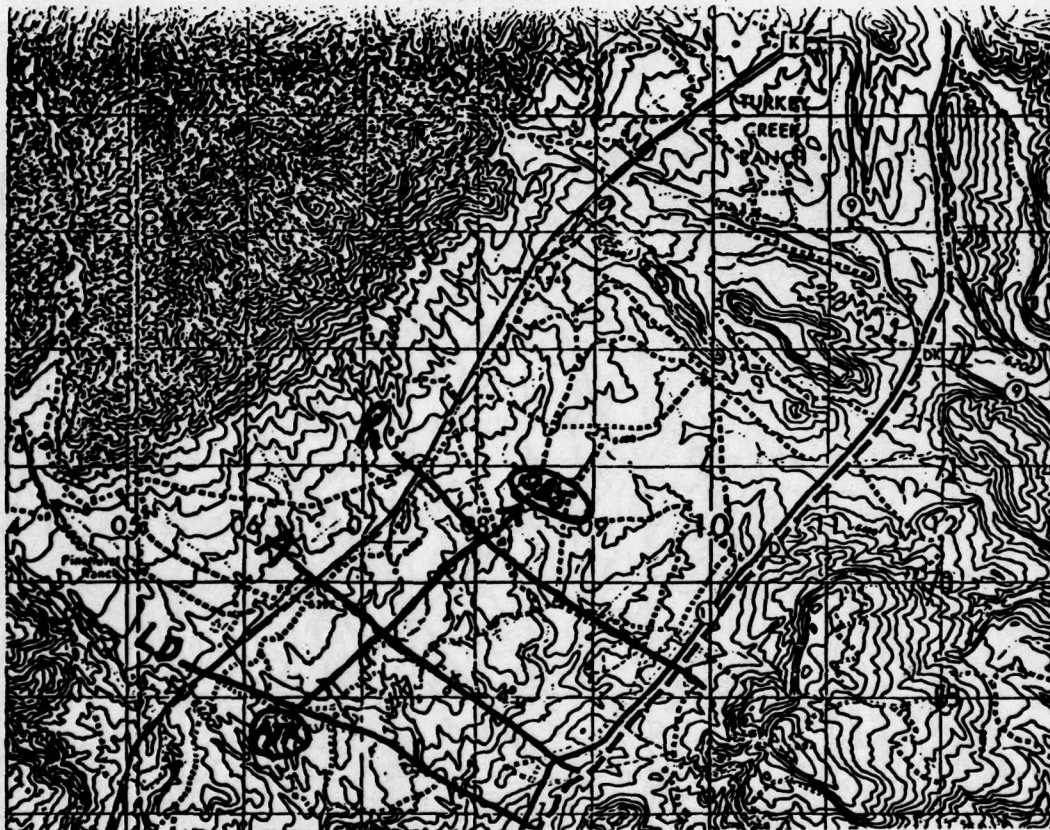
OPERATIONS ORDERS AND MAPS USED IN PRETRAINING AND POSTTRAINING TESTS



CTC OPORD - PHASE I & III - NORTH TO SOUTH LANE

"OPFOR tanks and ATMs have been observed in the vicinity of the high ground at 07407040 and 07857079. At 0615 hours, one medium tank was confirmed as being in position at 07407000. No dismounted troops have been observed. Enemy force estimated to be one tank platoon, reinforced with ATM's. The TOW Section will remain attached to your platoon, one 155 Battalion is in DS of our Battalion TP, you will have one FO Section accompany you. No other organic support is available to you for this mission. You will use your present location (09407300) as your Attack Position. This position is secured by friendly infantry. Your LD is the crest of the ridge running SE from 09207290. You will attack NLT H-Hour along the route, 08907310, 08707265, 08407160, 08407100 and seize and secure the high ground at 07407020. See Map. You must traverse the designated route with at least one tank section. After you clear the objective you will consolidate your elements to secure the high ground in that vicinity to deny its use to OPFOR. I will designate specific terrain for you to defend in that area to deny the OPFOR positions which overlook Hwy 11. I want you to get on the objective soonest; I will not be able to provide you any help except limited artillery fires.* You may use overwatch positions located on the LD if you wish. Report your arrival at, and passage of, all Phase Lines shown. I will follow your route of advance with the company command group. Any questions? (Ask questions in clarification of your Senior Controller.) The time is now H-Hour minus 45 minutes."

* We have an ASR of 49 HE rounds and 28 smoke rounds.



CTC OPORD - PHASE I & III - SOUTH TO NORTH LANE

"OPFOR tanks and ATMs have been observed in the vicinity of the high ground at 08507100 and 08157030. At 0615 hours one medium tank was confirmed as being in position at 08407100. No dismounted troops have been observed. OPFOR is estimated to be 1 tank platoon reinforced with ATMs. The TOW and FO Sections will remain attached to you, one 155 Battalion is in DS of our Battalion TF. No other organic support is available to you for this mission. You will use your present location (064688) as your Attack Position. This position is secured by friendly infantry. You will attack NLT H-Hour in the Direction-068684, 073700, and seize the high ground at 08507100. See Map. You must traverse the designated route with at least 1 tank section. After you clear the objective you will consolidate your elements to secure the high ground in that vicinity to deny its use to OPFOR. I will designate specific terrain for you to defend in that area to deny the OPFOR positions which overlook HWY 11. This terrain must be neutralized so as to secure the movement of the rest of our TF NW along HWY 11. Your LD runs generally along the road from 066680 along the forward edge of Hill 6465. The only help I can give you in case of contact is limited indirect fire support. We have an ASR of 49 rnds HE and 28 rnds SMOKE. You may occupy overwatch positions on the high ground to the rear of your LD if you choose. Report your arrival and departure from all Phase Lines. I will follow your route of advance. Any questions? (Ask of your Senior Controller). The time is now H-45 minutes."

APPENDIX B

TEST OPERATING PROCEDURES (TOP)

Test Operating Procedures and Rules of Engagement, North to South Lane

MISSION: ATTACK (Refer to Situation Map "A")

MAJOR TASKS: I. Planning and preparation for Mission - Initiating: CTC OPORD received by TU Leader

II. Movement to Contact

III. Conduct of Hasty Attack - Terminating: TU occupies objective or OPFOR retains objective.

MISSION ACCOMPLISHMENT CRITERIA: Objective is cleared of OPFOR.

Rules of Engagement

Event and Test Operating Procedures

This TOP describes the conduct of a Phase I or III test (North to South Lane). The narrative begins when preparations conducted on the Ready Line are complete, and the test unit (TU) is ready to move to the Attack Position. MCS will provide standard time on the REALTIME Control Net; all controller timepieces will be synchronized.

Event 1. Movement to initial positions (Administrative).

a. When the TU is ready to move from the ECC to the Attack Position, the Senior Tactical Controller will notify the OPFOR Tactical Controller and, with the Senior Field Scientist, will lead the TU to Attack Position "W". Movement from the ECC to the Attack Position is administrative. The route of movement from the ECC parallels Route 11 to approximately 114714, taking the left (NW) turn, and following the unimproved road generally NW to the Attack Position in the vicinity of 103720. The Section Mappers for the light and heavy sections will follow the TU at the rear of the column. When the TU has moved out of sight of the

1. TU will move out from ready line before the OPFOR does. OPFOR will not move out until TU has reached a position where they cannot observe OPFOR movement.
2. OPFOR will be in position prior to the TU Platoon Leader's personal reconnaissance of the area.
3. Movements of both forces to their initial tactical positions will be administrative. No fires of any kind are allowed.
4. Once the TU PL has received the CTC OPORD, the TU is permitted to register IDF.
5. During the attack mission, the TU will be opposed by OPFOR TOWs, artillery (FO) and Light Section tanks only.

MISSION: ATTACK (continued)

Event and Test Operating Procedures

Rules of Engagement

Tactical Controller will notify the OFFOR Controller that the OFFOR may move. The OFFOR Controller will order OFFOR to move to their predesignated positions.

b. The OFFOR TOWs deploy to their positions (MARIA) at 079708 and 080704; the light section tanks will move to (GINDY) 074698; the heavy section will move to a hide position in the vicinity of 073688. The OFFOR Tactical Controller, with the OFFOR Field Scientist, will verify the locations of OFFOR combat vehicles, to include that of any dismounted TOW. When checks have been completed, the OFFOR Controller will notify the Senior Tactical Controller. (See

Map A)

c. Immediately after the departure of OFFOR, FOC will dispatch the Fire Markers to their initial positions. In the event that pre-planned fire requests have been called in, Fire Markers will be sent to positions to maximize coverage of the terrain. Location of Fire Markers is under the direction of the Senior Tactical Controller

MISSION: ATTACK (continued)

Event and Test Operating Procedures

Event 2. Reconnaissance and issuance of OFORDs by CTC and PL.

a. Upon notification that the OPTOR are in position, the Senior Tactical Controller will move with the TU Platoon Leader to a position overlooking the test lane (vicinity of 101719) and will head the written CTC OFORD to the TU Leader. Following delivery of the CTC OFORD, the Senior Tactical Controller will inform MCS, FDC, and the OPTOR Controller of the time the order was delivered and the anticipated LD time. The OPTOR Controller will alert OPTOR elements.

b. The TU Platoon leader will formulate his plan and time in order. The Senior Field Scientist will notify the MCS of the time the PL's order is issued.

Rules of Engagement

1. The TU will be directed to cross the LD 45 minutes after the time of the Platoon Leader's receipt of the CTC OFORD.
2. No direct fires will be allowed until the Senior Tactical Controller reports that TU has crossed the LD.
3. Only smoke and registration missions by indirect fire are permitted until the TU has crossed the LD. In the event that indirect fire is called for before this time, FDC will acknowledge and record requests, informing the requester that they cannot be fired due to higher priority engagements.

MISSION: ATTACK (Continued)

Event and Test Operating Procedures

Event 3. TU crosses the LD, moves to contact.

a. The TU departs the Attack Position and crosses the LD at H-Hour. The Senior Tactical Controller announces the crossing of the lead element over the Control Net. The OPFOR Controller will inform the OPFOR Platoon Leader over the OPFOR tactical net and will notify the OPFOR TOW Section and Lt Tank Section Controllers over the REALTRAIN Control Net.

b. The Heavy Section Mapper follows the TU Platoon Leader's Section, the Light Section Mapper follows the Light Section, throughout the test to trace the movement of the sections. All such movement is tactical.

Rules of Engagement

1. The TU Leader is free to select tank/TOW routes and firing positions so long as the route of advance designated in the CTC OPORD is traversed by at least one TU tank section.
2. Upon TU's crossing the LD, both sides are free to engage targets by both direct and indirect fires.
3. OPFOR will occupy the same OP's and initial positions for each test replication though both tanks and TOWs are free to adjust firing positions (assume alternate positions within 50 meters) once they have made contact with the TU.

MISSION: ATTACK (continued)

Event and Test Operating Procedures

Event 4. The TU responds to contact, develops the situation.

a. In this event, first contact may occur either through a firing event or through observation.

b. When the forward elements of the attacking TU reach the Forward TOW withdrawal line (see Map A), the Senior Tactical Controller will report this to the OFFOR Tactical Controller. Upon receipt, the OFFOR Tactical Controller will order the OFFOR Platoon Leader to order the TOWs to displace to their counterattack support positions vicinity 065693 (Position DORIS).

c. As the TU continues to maneuver against the objective, the OFFOR Light Section will hold in place and continue to engage until two conditions are met: (1) the TU forward elements have reached the Light Tank Section withdrawal line (Map A), and (2) one of the OFFOR Light Section tanks has been declared a casualty. The Senior Tactical Controller will notify the OFFOR Tactical Controller when the TU forward elements have reached the Light Tank Section Withdrawal Line. When both conditions are met, the OFFOR Tactical Controller will, through the OFFOR Platoon Leader, order the withdrawal of the remaining OFFOR Light Section tank to its counterattack position in the vicinity of 070689 (Position BETTY). The remaining tank will displace tactically, leaving behind the tank which has been destroyed. (If both the OFFOR defending tanks have been assessed casualties, both will remain in place until the administrative break.)

Rules of Engagement

1. Free maneuver will be used by the TU.
2. All casualties will follow REALTRAIN procedures and remain in place until ordered to relocate by either the Senior Tactical Controller or the OFFOR Tactical Controller.
3. Regardless of the tactical situation with respect to casualties, the OFFOR will withdraw on order from the TOW positions when the Senior Tactical Controller reports that the Tested Unit has crossed TOW withdrawal line. Such withdrawal will be conducted under cover of the overwatching Light Tank Section located on Objective "S". Previously selected routes of withdrawal will be used and both TOWs will withdraw to their counterattack position in the vicinity of 065693.
4. Both sides are free to engage at will by direct and indirect fire during Event 4.
5. No artillery fires will be placed upon the objective area following withdrawal of the Light Section tank.

MISSION: ATTACK (continued)

Event and Test Operating Procedures

Rules of Engagement

Event 4. (continued)

- e. Upon withdrawal of one, or destruction of both, OPFOR Light Section tanks, the TU's final objective will have been left vacant. Upon occupation of the final objective by at least one TU vehicle or upon the OPFOR's destruction or neutralization of the TU threat, the Senior Tactical Controller will terminate the exercise.

MISSION: ATTACK (continued)

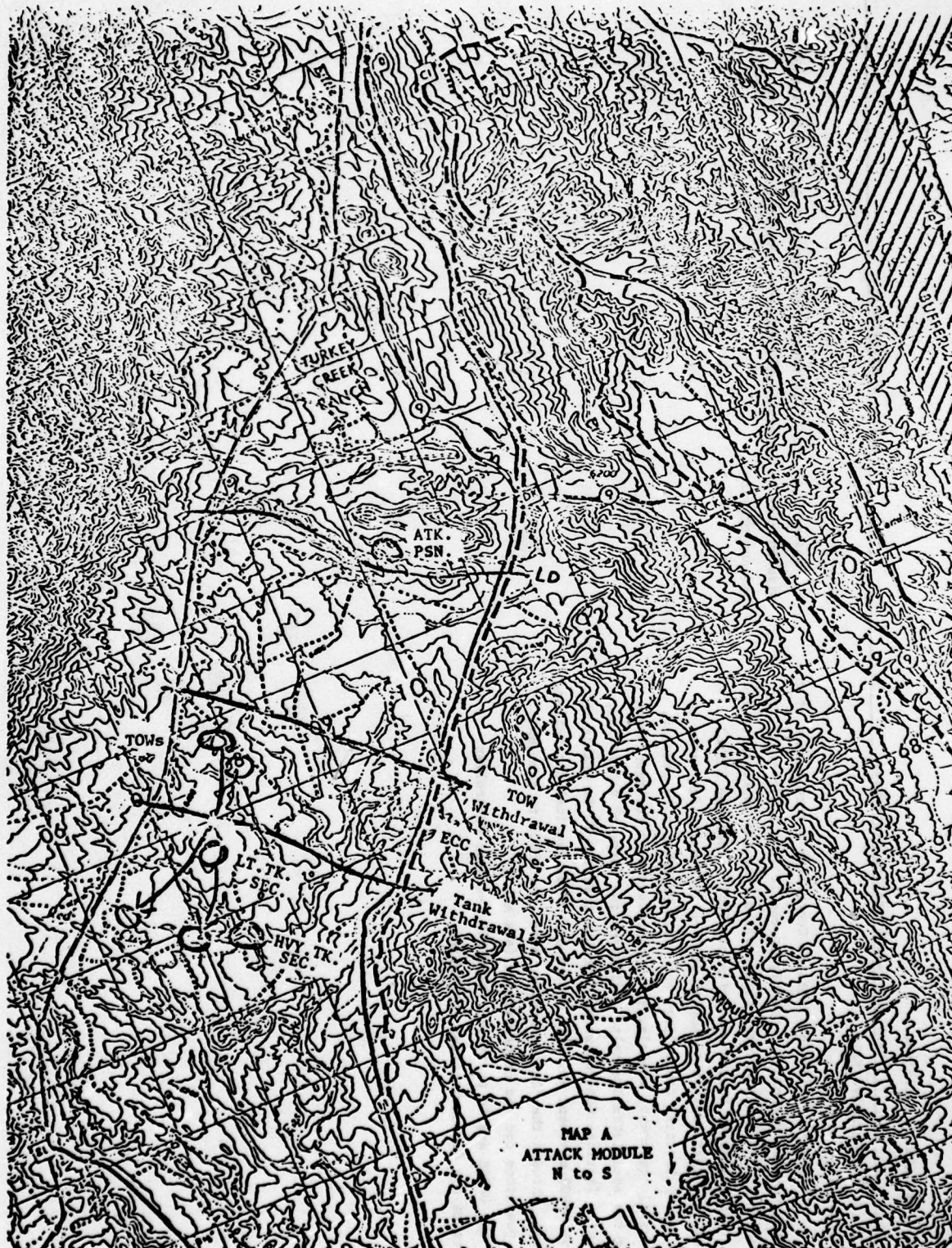
Event and Test Operating Procedures

Rules of Engagement

Event 5. Administrative Halt

a. Following the Senior Tactical Controller's termination of the exercise, he will direct the assembly of the TU in the vicinity of 076706; the OPFOR Tactical Controller will direct the assembly of the OPFOR less the Heavy Section vicinity of 072697 (Position ETHEL). Tactical and test support personnel will be informally debriefed at this time by Tactical Controllers and Field Scientists to identify procedural, equipment, vehicle, and support problems for resolution during the administrative halt. Following the informal debriefing, the Senior Tactical Controller will insure that the TU is unable to observe OPFOR movement and will inform the OPFOR Tactical Controller, who will, through the Platoon Leader, order the OPFOR to take up their positions for the counterattack (see Map B). After the OPFOR are in position, the OPFOR Tactical Controller reports to the Senior Tactical Controller.

a. Tested Unit and OPFOR casualties incurred during the attack mission will be reconstituted prior to the beginning of the Defense Mission.



APPENDIX C

CASUALTY ASSESSMENT PROCEDURES

General. Weapon systems played in this experiment consisted of (a) tank main gun (105mm cannon), (b) TOW Heavy Antitank Weapon, and (c) indirect fire (155mm artillery). In general, direct fire casualties were assessed when a controller aboard a firing vehicle informed the controller aboard the target vehicle that the target vehicle had been hit. Indirect fire casualties were assessed when a simulated high explosive (HE) round impacted within a specified radius of a tactical vehicle. Firemarkers were primarily responsible for assessing indirect fire casualties. The following sections describe the specific procedures employed to assess the casualties inflicted by each type of weapon system. The casualty assessment procedures employed in this study followed those contained in TC 71-5, REALTRAIN, Tactical Training for Combined Arms Elements.

Direct Fire

Personnel. In all REALTRAIN exercises a controller was stationed aboard each tactical vehicle. REALTRAIN controllers were responsible for the timely and accurate assessment of casualties, for insuring that REALTRAIN rules and procedures were followed, and for insuring that casualties remained stationary and did not participate further in the exercise.

Equipment

Optics. Ten power telescopes were installed on all tanks and TOWs and were used by controllers to identify target vehicles during engagements. On the TOW, telescopes were mounted on top of the gunner's sight, and on tanks they were mounted in the main gun breech.

REALTRAIN Panels. Twenty-inch-square, two-digit number panels were mounted on all tactical vehicles in order to identify individual vehicles. Four panels were mounted on the four sides of all tanks, TOWs, and the forward observers' 1/4-ton vehicles. Also, one panel was mounted on the tank cupola, and one additional panel was carried by each TOW to be used if the TOW was employed dismounted. Controllers insured that REALTRAIN number panels were not obscured by camouflage.

Radios. AN/PRC-77 radios were used by all controllers to communicate among themselves and to the REALTRAIN net control station. Special headsets allowed controllers to monitor intra-tank communications.

Simulators. Tank weapon signatures were simulated using a Hoffman device. TOW signatures were simulated using either a TOW backblast simulator, or, when these became in short supply, a hand grenade simulator.

General Procedures. When a direct fire hit was made, the controller on board the firing vehicle transmitted the REALTRAIN panel number of the target vehicle, the words "hit by" and the panel number of his vehicle (e.g., "38 hit by 29"). The REALTRAIN net control station (NCS) logged this information. Next, the controller on board the target vehicle transmitted the panel number of his vehicle and the word "confirmed," (e.g., "38 confirmed"). The NCS logged the confirmation. Only confirmed hits were counted as casualties. After the target vehicle controller confirmed the hit, he set off a green smoke grenade to signify that the vehicle had been hit. Tanks were also required to traverse the main tank gun over the rear deck and all vehicles were required to raise a flag on their radio antennas.

In some cases, the panel number of the target vehicle could not be clearly distinguished. Here, the firing vehicle controller transmitted the grid coordinates of the target in lieu of the target panel number. The senior controller attempted to identify the target vehicle and, if successful, informed the target vehicle controller that his vehicle was a casualty.

Tank Procedures. When a crew fires at a target, the tank controller immediately looks through the 10x telescope mounted in the breech of the main gun. If the crosshairs of the telescope were on a target and if the tank main gun simulator is detonated, the controller transmitted a hit over the REALTRAIN net.

Any target receiving a direct hit from the 105mm main tank gun was considered destroyed. In addition, all exposed personnel or TOW weapon systems within 10 m of the target were destroyed.

TOW Procedures. When the TOW gunner began to acquire a target, the controller views the target through his 10x telescope. When the gunner triggered the TOW, the controller detonated a backblast simulator (or hand grenade simulator) to the rear of the TOW vehicle. In order to determine the time of impact of the missile, the controller had to estimate the missile flight time. Since the velocity of the TOW missile is approximately 200 m per second, the time of flight (in seconds) is equal to the range of the target (in meters) divided by 200 m/second. If the crosshairs of the controllers 10x sight were on target at the end of the estimated time of flight, then the controller transmitted a hit over the REALTRAIN net.

No casualty was assessed if (a) the missile path was obstructed by terrain features, foliage, etc., (b) if the target range was less than 65 m, and (c) if the target range was greater than 3000 m. Any target receiving a direct hit from a TOW missile was destroyed. In

addition, all exposed personnel or TOW weapon systems within 10 m of the target were destroyed.

Indirect Fire

General. Upon receipt of a smoke or high explosive (HE) fire mission, Fire Direction Center (FDC) personnel calculated the location of the incoming rounds and transmitted these to the firemarker nearest the location. The four firemarkers were responsible for delivery of all indirect fire missions and for assessing casualties resulting from HE missions.

When a firemarker received a mission from the FDC, he moved to the location specified. Firemarkers were aided in their land navigation by 16 numbered checkpoints located on key terrain features throughout the test area. They were also provided with 1:25,000 topographic maps which had the checkpoints indicated.

Upon arrival at the impact location, firemarkers detonated the rounds which had been requested. HE fire-for-effects and adjusting rounds were simulated with the use of ground burst simulators (M115A2). One round was detonated to simulate an adjusting round. Five rounds were detonated to simulate a fire-for-effect, placed at the center and corners of a 150 m by 300 m rectangle. White smoke grenades were used for smoke screening fire-for-effects.

Following delivery of the fire mission, the firemarker reported the delivery to the FDC and assessed casualties as appropriate. Casualties were assessed in terms of distance from the point at which HE simulators were detonated, as follows:

0-10 meters: Tanks lose mobility and commo. APCs and wheeled vehicles are destroyed. All exposed personnel are killed.

10-50 meters: Tanks lose comm. APCs and wheeled vehicles are destroyed. All exposed personnel are killed.

50+ meters: No effects.

Casualties were transmitted over the REALTRAIN control net in a similar form to direct fire casualties (e.g., "38 hit by indirect fire"). All request times, splash times, number of rounds delivered, impact location, etc. were recorded in the FDC. In instances where REALTRAIN controllers disagreed with firemarkers concerning assessed casualties, the decision of the senior tactical controller was final.

When the FDC was informed that the requested rounds had been delivered, they, in turn, informed the requesting unit. The FDC did not, however, inform the tested units or OPFOR of the effects of the indirect fire.

Indirect Fire

General: Upon receipt of a smoke or high explosive (HE) fire mission, the Fire Support Center (FSC) personnel calculated the location of the incoming rounds and requested them to the fire support nearest the location. The fire support was responsible for delivery of all indirect fire missions and for assessing casualties resulting from the mission.

When a fire support received a mission from the FSC, he moved to the location specified. Fire support were aided in their land navigation by the command checkpoints located on key terrain features throughout the test area. They were also provided with 1:50,000 topographic maps which had the checkpoints indicated.

Upon arrival at the impact location, fire support detonated the rounds which had been requested. At first-for-effects and adjusting rounds were initiated with the use of ground burst simulators (M122). The round was detonated to simulate an adjusting round. Five rounds were detonated to simulate a first-for-effect. Placed at the center and corners of a 150 m by 100 m rectangle. White smoke grenades were used for smoke screening first-for-effects.

Following delivery of the fire mission, the fire support reported the delivery to the FDC and assessed casualties as appropriate. Casualties were assessed in terms of distance from the point at which the simulators were detonated, as follows:

0-15 meters: Tanks lost mobility and combat. APCs and wheeled vehicles destroyed. All exposed personnel are killed.

15-30 meters: Tanks lose combat. APCs and wheeled vehicles destroyed. All exposed personnel are killed.

30+ meters: No effects.

Casualties were transmitted over the REACTOR control net in a similar form to direct fire casualties (e.g., "38 hit by indirect fire"). All request times, splash times, number of rounds delivered, impact location, etc., were recorded in the FDC. In instances where REACTOR controllers disagreed with fire support concerning assessed casualties, the decision of the senior tactical controller was final.

APPENDIX D

DATA FORMS

LIST OF DATA FORMS

<u>Form No.</u>	<u>Individuals Responsible for Completing Data Forms</u>
1	Field Scientist
3/3A	FO Data Collector
5	Fire Direction Center Data Collector
6	Net Control Station Data Collector
8	Test Unit Controllers
9	OPFOR Controllers

Data Form No. 1

NAME _____

TRIAL NO. _____

DATE _____

TESTED UNIT I.D. _____

TEST: PRE _____ POST _____

SENIOR FIELD SCIENTIST

Planning Phase

Warning Order.

1. Did the Platoon Leader issue a warning order to his subordinates?

Yes () No ()

2. If a warning order was issued, did it include:

a. Movement instructions to the unit? N/A () Yes () No ()

b. Location of enemy position? N/A () Yes () No ()

c. Time of the attack? N/A () Yes () No ()

Supplementation of Information Provided in the CTC Attack Order

3. Did Platoon Leader move to a vantage point in the area of the attack position and make a personal reconnaissance? N/A () Yes () No ()

4. If the Platoon Leader makes a personal reconnaissance, was he accompanied by the FO? N/A () Yes () No ()

5. Did the Platoon Leader request additional information from the Company Commander? N/A () Yes () No ()

6. Did Platoon Leader discuss location of FO positions with the FO? N/A () Yes () No ()

Issuance of the Order

7. Did the Platoon Leader issue the order to all section leaders? N/A () Yes () No ()

Data Form No. 1 (continued)
Senior Field Scientist
Planning Phase

8. Was the order issued from a vantage point where the persons receiving the order could view the terrain? N/A () Yes () No ()
9. Did the attack order include:
- a. Information on OPFOR composition? N/A () Yes () No ()
 - b. Information on OPFOR location? N/A () Yes () No ()
 - c. Information on artillery support? N/A () Yes () No ()
 - d. Specific instructions to each section? N/A () Yes () No ()
 - e. Information about communications? N/A () Yes () No ()
 - f. Routes of advance for each section? N/A () Yes () No ()
 - g. Provisions for overwatch? N/A () Yes () No ()
 - h. Location of overwatch positions? N/A () Yes () No ()
 - i. Temporal coordination between overwatch and maneuver? N/A () Yes () No ()
 - j. Temporal coordination between smoke screening and maneuver? N/A () Yes () No ()
 - k. Temporal coordination between suppressive artillery fire and maneuver? N/A () Yes () No ()
10. Content of Order (Summarize order for each section with respect to overwatch positions and specific roles to be played by each section. Indicate routes of advance for each section on map).

Heavy Section:

FO DATA COLLECTOR
TU

Data Form No. 3

NAME _____

TRIAL NO. _____

DATE _____

TESTED UNIT I.D. _____

PHASE II III IV V VI

Platoon Leader's Order

1. Does Platoon Leader's order include:

a. Location of planned fires Yes () No ()

b. Location of smoke screening Yes () No ()

2. Give location of each planned fire from PL's order:

1. _____ 2. _____ 3. _____ (8 digit coordinate)

Time: _____

4. _____ 5. _____ 6. _____

Time: _____

7. _____ 8. _____ 9. _____

Time: _____

3. Give location of each smoke screen from PL's order:

1. _____ 2. _____ 3. _____ (8 digit coordinate)

Time: _____

4. _____ 5. _____ 6. _____

Time: _____

7. _____ 8. _____ 9. _____

Time: _____

4. Location of initial observation point selected by FO (8 digit coordinate) _____ as determined by data collector.

DATE _____

TESTED UNIT I.D.

ZUMA[illegible]

FIRE DIRECTION CENTER

Trial No. _____	Test _____	1. _____	5. _____
Date _____	Training _____	2. _____	6. _____
Unit I. D. _____	Shoot-Off _____	3. _____	7. _____
Name _____	CAT _____	4. _____	8. _____

[illegible]

Data Form No. 6
Page 1

NET CONTROL SHEET

Date _____

TEST: PRE POST
(Circle One)

Trial No. _____

NAME: _____

Unit I.D. _____

TIME	EVENT
	1. CTC order is issued.
	2. Platoon Leader has issued order to platoon. START OPFOR, START Tac. Tape
	3. First element crosses LD, attack begins. START Rt. Tape
	3a. Consolidation of OBJ begins with remaining force, 20 min.
	4. Attack Module and consolidate end. STOP Tapes.
	4a. Admin. Halt, TU casualties are resurrected.
	5. Defense Module begins with full force, 20 min max. to consolidate. START all Tapes.
	6. Consolidation of Defensive Position Ends.
	7. OPFOR Counterattack Begins.
	8. Defense Module ends STOP all Tapes

ATTACK

DATE _____

TRIAL _____

TESTED UNIT						OPFOR					
Vehicle	Veh. No.	TC No.	Load No.	Dr. No.	Gun No.	Vehicle	Veh. No.	TC No.	Load No.	Dr. No.	Gun No.
TK PL						TK PL					
TK						TK					
TK						TK					
TK PSG						TK PSG					
TK						TK					
TOW LDR						TOW LDR					
TOW						TOW					
FO						FO					

[illegible]

NAME

DATE _____

TESTED UNIT I.D.

TANK/TOW CONTROLLERS

[illegible]

CONTROLLERS

[illegible]

APPENDIX E

CRITERIA FOR ABORTED, INTERRUPTED, AND OMITTED TRIALS

- A. A trial will not be started if any one of the following criteria are met:
1. Any tested unit vehicle is not operational in the ECC area.
 2. More than one tested unit vehicle is not operational in the attack position.
 3. During Phase I, in one or more of the test unit crews:
 - a. The TC, gunner or driver is not MOS qualified; or
 - b. The TC, gunner or driver is not present.
 4. During Phases III or IV, in one or more of the tested unit crews, the TC, gunner or driver did not participate in Phase I.
 5. Any OPFOR vehicle is not operational in the ECC area.
 6. More than one OPFOR vehicle is not operational in the OPFOR initial start position.
 7. Some of the crew of any OPFOR vehicle (TC or gunner) has not been trained in the OPFOR duties and action sequences.
 8. Any platoon tactical net radio, REALTRAIN NCS radio or FDC net radio is not operational.
 9. The test lane has been judged untrafficable (determined by Senior Field Scientist and the Senior Tactical Controller).
 10. Weather is sufficiently inclement as to preclude meaningful exercise data to be gathered (determined by Senior Scientist and Senior Tactical Controller).
 11. One or more controllers are missing from either the tested unit or from the OPFOR.
- B. A trial will be interrupted for correction of operational problems if any one of the following criteria are met:
1. More than one tested unit vehicle or more than one OPFOR vehicle becomes nonoperational.

2. More than one of the controller radios becomes nonoperational on the NCS frequency.
 3. The REALTRAIN NCS radio(s) becomes nonoperational.
 4. Failure of the tested unit to follow critical elements of the CTC order. (Interruption of trial is a last resort: The Senior Tactical Controller and Senior Field Scientist will try to correct problems without interrupting the trial.)
 5. Failure of the OPFOR to follow the OPFOR scenario. (Interruption of trial is a last resort: The OPFOR Coordinator and the OPFOR Field Scientist will try to correct problems without interrupting the trial.)
 6. An injury occurs such that it would be dangerous for the injured party to continue the exercise.
- C. A trial will be shorted only if, in the judgment of the Test Director and the Senior Scientist, a condition listed in "A" or "B" (above) is sufficiently serious to preclude the safe conduct of the exercise or the collection of meaningful performance data.

APPENDIX F

PROCEDURES FOR ASSIGNING UNITS TO TREATMENTS

The procedure below will be followed in assigning test units to treatments (REALTRAIN (RT)) or conventional training (CT)).

From baseline test (Phase I) results:

1. Calculate ratio of track losses, tested unit/OPFOR, for each tested unit;
2. Determine operational time (total exercise duration less administrative times out) for each unit;
3. Multiply track loss ratio by operational time for each unit. Call the product P;
4. Rank units, within each cycle, by P;
5. In the first cycle, assign units ranked 1 and 4 to RT, ranks 2 and 3 to CT;
6. In the second cycle, assign units ranked 2 and 3 to RT, ranks 1 and 4 to CT.

APPENDIX G GUIDANCE FOR TRAINERS

TEST TRAINING AND EVALUATION OUTLINE (TETEO)

UNIT: TANK PLATOON*

MISSION: PLANNING AND PREPARATION FOR MISSION

1. GENERAL CONDITIONS

For the past 2 days, the OPFOR has been withdrawing and has succeeded in breaking contact. Latest intelligence reports the OPFOR is preparing to defend, but the location of his main force is unknown. The tested unit consisting of a platoon of tanks, a TOW section and an FO section is a part of the flank guard of a larger force whose mission is to protect the exposed flank of the main body. The platoon's mission is to gain contact with the enemy, provide flank security to the main body, facilitate its movement, and eliminate any enemy resistance that is within the platoon's capability. During the conduct of the operation, the platoon will encounter an element of the enemy force which is equipped with tanks and anti-tank missiles. The evaluator/controller will vary the combat power of the OPFOR depending on the action desired on contact.

2. PRIMARY TRAINING/EVALUATION STANDARDS

To receive a satisfactory rating, the platoon must successfully meet these standards:

*Each time the word "platoon" appears in the unit context it applies to the tank platoon, with a TOW section and FO section attached.

- a. Demonstrate necessary troop leading procedures which portray a trained unit preparing for combat operations.
- b. Reflect the recognition of a division of leader responsibilities which result in effective use of available time and space.
- c. Portray responsiveness to higher unit commands and coordination, and to the formulation of implementing orders.

3. TRAINING/EVALUATION RESULTS

Check SAT or UNSAT on the following pages of this T&E to indicate the unit's proficiency on each task for this mission. Phase II trainers/evaluators will record detailed observations of training deficiencies which need training emphasis on an attached sheet of paper. This T&E and attached sheets should provide the basis for continuous training during the period. The overall proficiency rating for this mission is determined from the performance of the unit on each task, the primary training and evaluation standards, and from the evaluator/trainer subjective judgment as to whether or not the unit would have been successful on the modern battlefield had it performed as it did in this exercise.

Circle one of the following to indicate the overall combat proficiency of the unit on this mission:

Overall Proficiency:

SAT

UNSAT

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: PLANNING AND PREPARATION FOR MISSION.

OVERALL MISSION RATING:

--

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
<p>1-1 To portray the procedures employed by a well trained combat unit preparing for combat operations.</p> <p>2-1 Application of necessary troop leading procedures at Platoon and subordinate leader levels.</p> <p>3-1 Recognition and use of time and space, by employing a knowledge of the chain of command and tactical SOP's.</p> <p>4-1 Practice of a division of tactical responsibilities within and between the tank crew, the section, and the</p>	<p>In daylight under tactical conditions: Crew Members perform vehicular, weapons, communication, checks in accordance with unit standard operating procedures, or as required by safe operating practices and a high degree of combat preparedness.</p> <p>Platoon leader moves his unit from the Ready Line to the Attack Position, receives a Company Team OPORD and issues a fragmentary operations order to the subordinate section leaders.</p> <p>Radio communications are held to a minimum or IAW orders of platoon leader (e.g., radio silence).</p>	<p>While on the Ready Line note the division of responsibilities among crew/section/platoon.</p> <p>Their use of time available and conduct of checks and necessary adjustments in accordance with priority:</p> <ol style="list-style-type: none"> 1. Vehicle 2. Armament 3. Ammunition 4. Communications 5. Secondary armament 6. Crew welfare/safety <p>Check their report of statistics to next higher echelon, and radio checks with company team, intraplatoon command net, and fire request net.</p> <p>Is the order issued at a vantage point, or OP if such selection aids understanding or clarity of mission? Fragmentary order is brief, concise and covers essential detail regarding:</p> <ol style="list-style-type: none"> 1. Information of the enemy. 2. Information of own supporting troops. 3. General plan of the platoon leader to 		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: PLANNING AND PREPARATION FOR MISSION (continued)

OVERALL MISSION RATING:

--

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
Platoon, in order to develop information required for a proper operations order.		<p>accomplish his task (concept of the operation).</p> <p>4. Specific orders to each subordinate element.</p> <p>5. Changes or additions to unit SOP's, or in command, control, communications.</p> <p>Special note should be made of the unit's use of available time, e.g., did platoon sergeant move the unit from the Ready Line to the Attack Position while the Platoon Leader used this time to make a personal reconnaissance?</p>		

SUGGESTED SUPPORT REQUIREMENTS (EVALUATION)
TANK PLATOON: PLANNING AND PREPARATION FOR MISSION

1. Administration: A team order must be prepared in advance by the evaluator for issue to the platoon leader. This OPORD will be utilized to lead into the continuing tactical mission (e.g., hasty attack followed by a defense and retrograde movement.)
2. Minimum Evaluators: 1 CPT, 1 LT/NCO. When REALTRAIN procedures are used the requirement will increase to at least one controller/evaluator per tank and crew served weapons.
3. Threat: 1 tank section, 1 TOW section, 1 FO section (exact number of aggressors must be determined by the evaluators based on action desired at contact).
4. Support Troops: TBD.
5. Vehicle/Communication: TBD.
6. Maneuver Area: A route of advance 6 - 8 km long and approximately 5 km wide.
7. Firing Area: None.
8. Training Aids, Devices, and Special Equipment: REALTRAIN equipment, tank main gun, artillery and ATM fire simulators.
9. Ammunition: TBD.
10. Key References: FM 17-1, and TC 71-5.

TANK PLATOON: PLANNING AND PREPARATION FOR MISSION (continued)

11. Tips for Trainers/Evaluators: During the standard field training exercise, one evaluator should act as the team commander on the team radio net. Radio contact should be maintained with the threat element to control their fires/actions. One evaluator should be located with threat element to evaluate tested platoon's proficiency in using terrain, suppressive/supporting fires, and movement techniques. This will permit the evaluator to make judgments based upon observation made from the "enemy" point of view as to how well the tested platoon performed this mission. REALTRAIN control procedures will be used for REALTRAIN based field training.

TEST TRAINING AND EVALUATION OUTLINE (TETEO)

UNIT: TANK PLATOON

MISSION: MOVEMENT TO CONTACT

1. CONDITIONS

The platoon is located in a concealed attack position which is in defilade from OPFOR. Departing the Attack Position, the platoon crosses the Line of Departure and adopts a technique of movement which is determined by the unit leader. The unit is not in contact with OPFOR. The Line of Departure may be used as the location of overwatch positions if the terrain is considered suitable.

2. PRIMARY TRAINING/EVALUATION STANDARDS

To receive a satisfactory rating, the platoon must successfully meet these standards:

- a. Conduct the movement with proper use of movement techniques, the terrain, and suppressive fires to maximize the combat power of the platoon and minimize its exposure and vulnerability to enemy fire.
- b. Determine the enemy's disposition and successfully develop the situation through application of proper tactical principles without sustaining excessive personnel casualties and equipment loss. (Evaluator judgment for standard type field exercises.)
- c. Demonstrate responsiveness to commands and coordination within the platoon, and to emergency situations as they occur.

MISSION: MOVEMENT TO CONTACT (continued)

3. TRAINING/EVALUATION RESULTS

Check SAT or UNSAT on the following pages of this T&E to indicate the unit's proficiency on each task for this mission. Phase II trainers/evaluators will record detailed observations of training deficiencies which need training emphasis on an attached sheet of paper. This T&E and attached sheets should provide the basis for continuous training during the period. The overall proficiency rating for this mission is determined from the performance of the unit on each task, the primary training and evaluation standards, and from the evaluator/trainer subjective judgment as to whether or not the unit would have been successful on the modern battlefield had it performed as it did in this exercise. Circle one of the following to indicate the overall combat proficiency of the unit on this mission:

Overall Proficiency:

SAT

UNSAT

TRAINING AND EVALUATION

OVERALL MISSION RATING:

UNIT: TASK PLATOON
MISSION: MOVEMENT TO CONTACT

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
I-II Establish and maintain physical and C&E security measures in the attack position.	In daylight under tactical conditions: a. Platoon Leader has presented his OPOD to his unit. b. Mortar and artillery fires are available subject to priorities. c. The attack position is being secured by friendly forces.	All types of security measures are required in the attack position. The two sub-tasks described, security operations and conduct of the unit movement should be carried out quickly. The division of responsibilities within the crew should be noted to determine the speed and coordination with which each task is accomplished.		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: MOVEMENT TO CONTACT (continued)

OVERALL MISSION RATING:

--

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
2-II Use of proper movement techniques.	Considering the above, the platoon moves out of the attack position.	Correct movement techniques are used by the unit: It uses traveling when contact is not likely, traveling overwatch when contact is possible and bounding overwatch where contact is likely. The platoon's execution of these movement techniques optimizes the use of terrain to minimize its exposure and to maximize its ability to deliver suppressive fires from the best available overwatch position. Op's will be established when it is infeasible to occupy the firing position with the TOW/tank. The platoon's movement must be characterized by aggressiveness and must maintain the momentum of the approach march utilizing cover and concealment.		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: MOVEMENT TO CONTACT (continued)

OVERALL MISSION RATING:

--

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
3-II React to enemy contact.	Platoon is engaged by enemy ATM or tank fire.	Reconnaissance by both direct and indirect fires are used when they provide adequate coverage of the selected routes of march. Platoon promptly takes cover and returns the fire. The situation is developed by personal reconnaissance by leaders, reconnaissance by fire, and maneuver. Platoon subordinate leaders report to the tested unit leader the strength and location of the enemy. Action is decisive and positive. Maneuver should demonstrate an effective division of responsibilities and maximum coordination within platoon, in addition to an appreciation of enemy situation and terrain conditions.		

TRAINING AND EVALUATION

UNIT: TANK PLATOON
MISSION: MOVEMENT TO CONTACT (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING
		<p>Reports as to friendly locations and the nature of terrain are submitted by secure means on a timely basis. Information as to OPFOR activities are reported in the clear.</p>	

SUGGESTED SUPPORT REQUIREMENTS (EVALUATION)

TANK PLATOON: MOVEMENT TO CONTACT

1. Administration. A team order must be prepared in advance by the trainer/evaluator for issue to the platoon leader. This OPORD should be utilized to lead into the continuing tactical mission.
2. Minimum Evaluators: 1 CPT, 1 LT/NCO. When REALTRAIN procedures are used the requirement will increase to at least one controller/evaluator per tank and crew served weapon.
3. Threat: 1 tank section, 1 TOW section, 1 FO section (exact number and organization of OPFOR may be determined by the evaluators based on action desired at contact).
4. Support Troops: TBD.
5. Vehicle/Communication: TBD.
6. Maneuver Area: A route of advance 6 - 8 km long and approximately 5 km wide.
7. Firing Area: None.
8. Training Aids, Devices, and Special Equipment: REALTRAIN equipment, tank main gun, artillery and ATM fire simulators.
9. Ammunition: TBD.
10. Key References: FM 17-1, and TC 71-5.

TANK PLATOON: MOVEMENT TO CONTACT (continued)

11. Tips for Trainers/Evaluators: For standard field exercises, one evaluator should act as the team commander on the team radio net. Radio contact should be maintained with the threat element to control their fires/actions. One evaluator should be located with threat element to evaluate tested platoon's proficiency in using terrain, suppressive/supporting fires, and movement techniques. This will permit the evaluator to make judgments based upon observation made from the "enemy" point of view as to how well the tested platoon performed this mission. REALTRAIN based field training will be IAW

TC 71-5.

TRAINING AND EVALUATION OUTLINE (TETEO)

UNIT: TANK PLATOON

MISSION: CONDUCT OF THE ATTACK

1. CONDITIONS

The platoon is in contact with the enemy and will conduct a hasty attack. The OPFOR consists of tanks and ATMs. The platoon leader has been given a Company Team OPORD which directs him to "protect the main body", and to attack and destroy OPFOR within his capabilities. He must issue necessary frag orders to his subordinate elements.

2. PRIMARY/TRAINING EVALUATION STANDARDS

To receive a satisfactory rating, the platoon must:

- a. Conduct the hasty attack taking appropriate action (e.g., destroy or fix enemy and request support) without sustaining excessive personnel casualties and equipment loss. Positive actions are required of the platoon in order to develop the situation fully, and apply all the combat power available.
- b. Upon destroying OPFOR or seizing a designated terrain objective, the TU consolidates and prepares for the defense of an area.

3. TRAINING/EVALUATION RESULTS

Check SAT or UNSAT on the following pages of this T&E to indicate the unit's proficiency on each

MISSION: CONDUCT OF THE ATTACK (continued)

task for this mission. Trainers/evaluators will record detailed observations of training deficiencies which need training emphasis on an attached sheet of paper. This T&E and attached sheets will provide trainer a basis for continuous training during the period. The overall proficiency rating for this mission is determined from the performance of the unit on each task, the primary training and evaluation standards, and from the evaluator/trainer/controller subjective judgment as to whether or not the unit would have been successful on the modern battlefield had it performed as it did in this exercise. Circle one of the following to indicate the overall combat proficiency of the unit on this mission:

Overall Proficiency:

SAT

UNSAT

TRAINING AND EVALUATION

UNIT: TANK PLATOON
MISSION: CONDUCT OF THE ATTACK

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
1-III Conduct Hasty Attack..	Platoon takes cover, returns fire, reports initial contact.	Platoon elements rapidly disperse, maintaining the integrity of each section. Platoon quickly engages the enemy. Fire control and distribution process account for the placing of the correct weapon/ammunition type on the target. Each tank/TOW is provided cover from the enemy fire. Action is taken to extract any element pinned down or otherwise exposed to enemy fire, and unable to contribute to the platoon's combat power.		
2-III Recognize and use of information available.	Each leader should place himself in a location from which he can secure the information desired in order to make an estimation of the immediate situation. Platoon Leader makes his personal reconnaissance and using inputs, if appropriate, from section leaders, completes his estimate; makes his decision and communicates the current enemy situation, and his decision to the Company Team Commander.	Leaders use multiple means of determining inputs to each estimation of the situation. These are: 1. Personal observation. 2. Information from higher, lower and adjacent elements.		
3-III Develop information required to complete PL estimate.				
4-III Provide security.				
5-III Transmit PL's decision to subordinate elements.				
6-III Make necessary adjust-				

TRAINING AND EVALUATION

UNIT: TANK PLATOON
MISSION: CONDUCT OF THE ATTACK (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
<p>men to the platoon's disposition rapidly and without the requirement for excessive control.</p> <p>7-III</p> <p>Integrate the indirect fire plan with the scheme of ground maneuver.</p> <p>8-III</p> <p>Reflect the use of planned fire and maneuver during the execution of the attack.</p> <p>9-III</p> <p>Demonstrate the use of</p>	<p>Tested unit maintains a moderate volume of fire on the enemy position to assist Platoon Leader in developing situation. In accordance with initial team order (issued in the Attack Position), the platoon attacks immediately to regain or retain the initiative.</p>	<p>The Platoon Leader communicates his decision to the tank, TOW and FO section leaders. Platoon Leader's coordination, and requirements for support from the TOW and FO sections are in the form of mission type orders. TOW section leader selects his positions to support from a general area designated by the Platoon Leader. FO Section plans fire in support of the platoon attack based upon requests from Platoon Leader. Additional defensive fires on targets of opportunity are attacked by FO without referring to Platoon Leader.</p> <p>Platoon Leader scheme of maneuver uses principle of fire and movement. TOW's</p>		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: CONDUCT OF THE ATTACK (continued)

OVERALL MISSION RATING:

--

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
both on board weapons and indirect fires. 10-III Secure the objective area.		are placed in overwatch position and place suppressive fires on the enemy position as the tanks maneuver using bounding overwatch. Artillery fires are placed on the objective area in an attempt to destroy or suppress the enemy. Both fires of TOW and artillery are shifted, upon pre-arranged signal, to flanks of objective area or on targets of opportunity in the rear of the enemy positions. Tanks maneuver by section and in mutual support. Each tank employs the most effective weapon/ammunition combination to engage the enemy target. Smoke is used to screen the movement of the friendly		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: CONDUCT OF THE ATTACK (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		force elements where natural concealment and cover is lacking. Platoon uses reconnaissance by fire to develop enemy situation. Targets of greater potential danger are engaged first. Fire control techniques are employed to ensure coverage of the objective area in the event precise enemy target locations are unknown. Correct combat gunnery processes used by each crew engaging a target. The objective is reported secure to the Company Team Commander. Movement is oriented on the enemy, units do not back track, make false starts, or		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: CONDUCT OF THE ATTACK (continued)

OVERALL MISSION RATING

TRAINING OBJECTIVES	CONDITINS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		<p>otherwise display a lack of terrain appreciation which could leave them exposed to enemy observation for unacceptable periods of time.</p> <p>Platoon reorganizes quickly, security provides for both local and distant threats.</p> <p>All likely avenues of approach are covered.</p> <p>OP's are established if such increases the platoon capability to apply combat power to its area of interest. Division of responsibility during this critical phase should clearly provide for objective consolidation without unnecessary or undue movements, excessive communications or detailed orders</p> <p>The tested unit should redistribute combat</p>		
	<p>Report combat status of unit to next higher headquarters including the location and disposition of both friendly and enemy forces.</p>			

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: CONDUCT OF THE ATTACK (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		power and tactical responsibilities as a result of casualties suffered (evidence of unit SOP or practical training).		

TRAINING AND EVALUATION OUTLINE (TETO)

UNIT: TANK PLATOON

MISSION: DEFENSE AGAINST COUNTERATTACK

1. CONDITIONS

The platoon has been ordered to defend. The company team has designated general position areas to occupy and have established a time priority for preparation for the defense. After preparation of its defensive area, the platoon will be struck by a tank-led counterattack and as the result of overall enemy successes, will be ordered to delay back to a company team designated initial delay position.

2. PRIMARY TRAINING/EVALUATION STANDARDS

To receive a satisfactory rating, the platoon must organize or occupy their primary positions within the time specified by the Company Team Commander, reconnoiter routes to and establish alternate positions, and defend from mutually supporting battle positions. Finally to wear down and disrupt the movement of the counterattacking enemy force.

3. TRAINING/EVALUATION RESULTS

Check SAT or UNSAT on the following pages of this TETO to indicate the unit's proficiency on each task for this mission. Trainers/evaluators will record detailed observations of training deficiencies which

MISSION: DEFENSE AGAINST COUNTERATTACK (continued)

need training emphasis on an attached sheet of paper. This T&E and attached sheets should provide the trainer a basis for continuous training during the period. The overall proficiency rating for this mission is determined from the performance of the unit on each task, the primary training and evaluation standards, and from the evaluator/trainer subjective judgment as to whether or not the unit would have been successful on the modern battlefield had it performed as it did in this exercise. Circle one of the following to indicate the overall combat proficiency of the unit on this mission:

Overall Proficiency: SAT UNSAT

TRAINING AND EVALUATION

OVERALL MISSION RATING:

UNIT: TANK PLATOON
MISSION: DEFENSE AGAINST COUNTERATTACK

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
<p>1-IV</p> <p>To plan and conduct a mobile type defense.</p> <p>2-IV</p> <p>To demonstrate knowledge of techniques of both selection and occupation of a defensive firing position.</p> <p>3-IV</p> <p>To reflect the division of responsibilities within the tank crew, tank/TOW section and platoon in achieving</p>	<p>It is daylight and platoon has been successful in driving the enemy off its objective area. The team commander has ordered the platoon to prepare the defensive position and be prepared to withdraw on order and delay to designated delay positions.</p> <p>The Platoon Leader must interpret the defensive tasks assigned by the Company Team Commander and prepare and deliver his own plan of operations. TOW section must provide necessary support to the tank platoon. FO section will prepare</p>	<p>Satisfactory performance of the platoon is demonstrated by:</p> <p>The Platoon Leader issuing a fragmentary order to key leaders of his platoon (section sergeant is minimum acceptable level, each tank commander, is practical ideal). He must coordinate the necessary requirements for support with TOW and FO section leaders. The order and coordinating activities should include the following information:</p> <ol style="list-style-type: none"> 1. Information of the enemy 2. Mission of the Company Team 3. Mission of the platoon 4. Initial plan of the platoon leader, 		

TRAINING AND EVALUATION

UNIT: TANK PLATOON
MISSION: DEFENSE AGAINST COUNTERATTACK (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
Objectives 1 and 2 above. 4-IV To defend against a tank led counterattack with fire and maneuver.	and coordinate the details of the artillery fire plan with the supported units. Both direct and indirect fires are coordinated, controlled and distributed. Platoon occupies the battle position and organizes the defensive position.	including necessary contingency plans. 5. Specific orders to each tank section. 6. Mission type orders, requests and coordination with TOW and FO sections. 7. Measures not covered by unit SOP's. Route of approach and the selection and occupation of firing positions should indicate prior preparation through either personal or map reconnaissance. Division of responsibilities within the tank crew/section and platoon should be apparent, each member contributes to the accomplishment of each combat task or function. Platoon Leader fights his own section as well as controls and coordinates the movement or activities of the light section.		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: DEFENSE AGAINST COUNTERATTACK (continued)

OVERALL MISSION RATING:

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TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		Platoon occupies firing positions with tank/TOW only when weapon is not under possible observation by the enemy. Initial firing positions are mutual supporting, indirect fires are integrated into the defensive fire plan to account for those areas not covered by direct fire. Firing positions selected provide opportunity to open fire at the maximum ranges. Covered route of movement into or out of each position available.		
Platoon conducts an active, mobile type defense against a tank led enemy force.		Tanks and TOWs open fire at the maximum range. Firing positions are changed after each engagement, maximum exposure to enemy fire does not exceed 9-12 seconds.		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: DEFENSE AGAINST COUNTERATTACK (continued)

OVERALL MISSION RATING:

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TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		<p>Tanks are TOWs fire alternately by sections, and fire platoon volley fire when such is feasible.</p> <p>Dismounted observers are used forward to guide tank into firing position when it is infeasible to occupy the position with the tank itself.</p> <p>Priority communication between tanks is:</p> <ol style="list-style-type: none"> 1. Voice 2. Signal (flag or hand and arm) 3. By example 4. Radio <p>Tanks and TOWs engage the enemy at maximum ranges, using covered routes into and out of firing positions.</p>		

TRAINING AND EVALUATION

UNIT: TANK PLATOON

MISSION: DEFENSE AGAINST COUNTERATTACK (continued)

OVERALL MISSION RATING:

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		<p>Tanks will remain exposed for minimum periods of time during firing (12 to 15 seconds when anti-tank "X" kill type weapons system are suspected). These correct gunnery processes will decrease exposure time:</p> <ol style="list-style-type: none"> 1. Target acquisition 2. Fire distribution 3. Fire commands 4. Crew duties 5. Accuracy of fire 6. Fire control (firing alternatively by section, by individual tank or by platoon volley) 		

TRAINING AND EVALUATION

OVERALL MISSION RATING:

UNIT: TANK PLATOON
MISSION: DEFENSE AGAINST COUNTERATTACK

TRAINING OBJECTIVES	CONDITIONS	TRAINING/EVALUATION STANDARDS	RATING	
			S	U
		<p>Maneuvering tanks within a section should avoid occupying same firing position as one just vacated by a firing tank. Alternate firing positions are selected preferably on alternate (different) terrain features.</p> <p>Fire control and distribution should be evidenced through use of massed or volley fires to include overhead artillery and supporting TOW fires. TOW and FO Sections move to alternate positions without orders from the Platoon Leader so as to ensure continuing support to the attacking platoon.</p>		

SUGGESTED SUPPORT REQUIREMENTS (EVALUATION)

TANK PLATOON: DEFENSE AGAINST COUNTERATTACK

1. Administration: Defense orders and enemy counterattack plans should be prepared in advance.
2. Minimum Evaluators: 1 CPT, platoon evaluator; 1 LT/NGO assistant evaluator. When REALTRAIN procedures are used, the requirement will increase.
3. Threat: 1 tank platoon, 1 TOW section, and 1 FO section.
4. Support Troops: TBD.
5. Vehicles/Communications: TBD.
6. Maneuver Area: A sector 1.5 - 3 km wide, 1 - 5 km deep, with 1 - 1.5 km observation to front and suitable primary and subsequent battle positions with likely avenues of approach for the enemy counterattack force.
7. Firing Area: None.
8. Training Aids, Devices, and Special Equipment: Tank main gun fire simulators, REALTRAIN equipment, artillery and TOW simulators.
9. Ammunition: TBD.
10. Key References: TC 17-12-1, TC 17-12-3, FM 17-1 and TC 71-5.

TANK PLATOON: DEFENSE AGAINST COUNTERATTACK (continued)

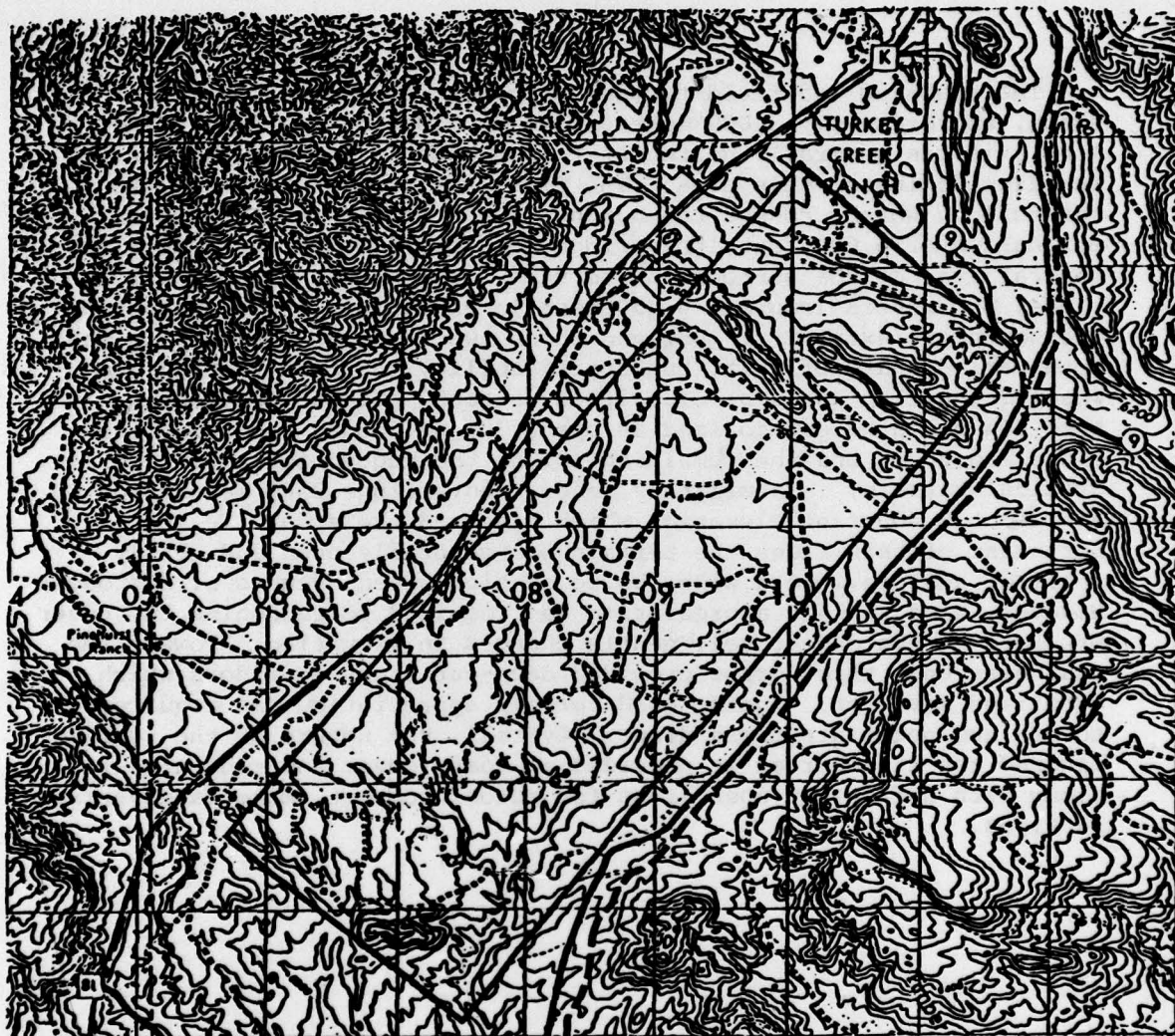
11. Tips for Trainers/Evaluators:

- a. Observe and evaluate platoon movement techniques and use of cover and concealment in the battle position from threat force positions.
- b. Monitor platoon radio to evaluate adequacy of OPSEC, orders, reports, and requests.
- c. Observe the actions of the platoon from positions within the enemy counterattack force as well as other vantage points within the friendly defensive area.

APPENDIX H

TERRAIN

The training and field testing area was roughly rectangular in shape, approximately 3,000 meters wide by 7,000 meters long. The long axis ran generally northeast to southwest. Two key terrain features dominated this area. The first was a ridge, about 3,000 meters long which crossed the northeast end of the area. With an evaluation of 6,600 feet, this ridge was some 200-300 feet above the general level of the surrounding terrain. The second feature was a ridge, 800 meters long and 6,450 feet in elevation, which dominated the southeast extremity. Between these two features the terrain was both varied and difficult, but trafficability for both tracked and wheeled vehicles could be classified as good. Of the total area, some 60% could be categorized as open, 30% as wooded and requiring close maneuver, and the remaining 10% as too rugged for use. The critical terrain, in a military sense, was a ridge 2500 meters long and about 6,400 feet elevation which bisected the area. To the northeast of this ridge the terrain was generally open and gently rolling, and provided a wide choice of high speed avenues of approach. However, good terrain appreciation was required to recognize the cover provided by the deceptively gentle changes in elevation. Toward the southeast end, three draws provided deep-cut cross corridors which canalized movement. Again, good terrain appreciation was required to use and negotiate these draws. Overall, the nature of the terrain favored the attacker as it provided adequate cover and concealment along with sufficient open areas for mutual support among maneuvering sections.



TERRAIN USED IN PRE-TRAINING AND POST-TRAINING TESTS

APPENDIX I

TEST NARRATIVE

SOUTH TO NORTH LANE

PL Attack Order

The order was issued from a vantage point where the unit could view the terrain. All vehicle commanders were present when the order was issued.

The platoon leader planned to attack the objective on the eastern flank with the heavy section while the light and TOW sections provided overwatch for the attacking element. The light section and one TOW were to travel towards the objective using a route which was in the general vicinity of the following coordinates: 073690, 080686, 084690, and 085700. The light section and TOW were then to remain south of the objective and cover the attack by the heavy section. The heavy section and one TOW were ordered to travel towards the objective via a route bordering Highway 11 to a point in the vicinity of 102701. The TOW was then to provide overwatch from the high ground at 103705 while the heavy section moved towards the objective.

The heavy section and one TOW were to move out of the attack position and move to an overwatch position at a point crossing grid 690. This element was then to provide overwatch for the light section and TOW as the latter element moved to a point where their route of advance intersected grid 690. The light element was then to provide overwatch for the heavy element as the latter moved to the intersection of their route of advance and grid 700. The light element was then to move to grid 700 while the heavy element provided overwatch. From that point in time the light element was to overwatch the heavy element from the vicinity of grid 700. Overwatching elements were to notify maneuvering elements that overwatch had been provided by giving the message "set" over the radio.

The FO was assigned to travel with the heavy section. The PL order included a request for smoke screening at 092708 to cover the attack on the objective. This mission was to be registered. The PL ordered the FO to provide preplanned H.E. on the objective. No mention was made of the time when these missions were to be employed.

PL Defense Order

The order was not issued from a vantage point where the unit could view the terrain. All vehicle Commanders were present when the order was issued.

The PL believed that the enemy would attack the objective via the western avenue of approach, and the PL said it was unlikely that the enemy would attack across the open ground to the east of the objective. The elements were thus assigned so as to cover the western approach. No elements were assigned to the eastern boundary of the objective. The light section was ordered to take up positions on the north central edge of the objective. The TOWs were assigned to positions on the western boundary of the objective. The heavy section was assigned to the north-western edge of the objective. The positioning of the light section provided some cover of the eastern approach.

The PL told the TOW section to ground-mount their weapons and he told the tank commanders to send out OPs.

The PL requested H.E. missions in the general vicinity of 087713 and 082718. These locations were selected because of the PL's expectations of an attack from the northwest. Provisions for the times when these fires were to be provided were not included in the order.

The Attack Tested Unit

Six of the tested unit crews were not briefed on the attack order given by the Platoon Leader. There was some confusion as they started to leave the assembly area about who was going to go where. There was no one left in overwatch. The heavy section took the low ground out of the attack position, so their movement was covered and concealed. The light section and the TOWs moved across the LD, moving north simultaneously with no one in overwatch position.

OPFOR Point of View: The tanks moved like columns of ducks. They followed each other--came out of the woods and stopped in the center clearing and were dead shots. The TOWs moved very well. The OPFOR tank 37 saw 56 and shot him. 56 was moving well, but not quite well enough. 80 moved right near where 56 got shot. He just pulled up a little too far in the woodline and the OPFOR got him.

How many of the tested unit vehicles were seen crossing the LD shortly thereafter? The only one seen near the LD was 24, and he was shot by 20. Then 3 minutes later, 13 was shot. Within 6 minutes they got the light section. They moved badly with the exception of the TOWs. Right. It's probably significant that the TOWs 56 and 80 were hit not by the OPFOR TOWs, but by the OPFOR light section.

The general route selected by the Platoon Leader did afford cover and concealment. That is why they were not picked up initially as they moved out of the assembly area. The light section deviated from the route indicated by the Platoon Leader. They crested early, and of course they were the first two to go. The light section and TOWs were moving in generally the same direction, but they were not covering each other. They were moving independently. There was not a single transmission between the Platoon Leader and his light section, or between either section of the tanks and TOWs. There was absolutely no coordination. When the light section bought it, the TOWs were left on their own. The heavy section Platoon Leader had gone clear south of Peanut Mountain, instead of attacking north. He was three grid squares south of that mountain before he figured out where he was.

The TOWs continued to move, and the controllers asked them, "Where are your tanks?" Neither one of the TOW section leaders had the foggiest idea about the location of the tanks or made any attempt to try to call them. The TOWs, after the light section moved, continued to move in covered and concealed routes. However, the TOWs were just moving one behind the other in the attack. Why? I don't know. They were very noisy in their movement. That's how the OPFOR initially picked them up. They were crossing open areas. The OPFOR was occupying those areas which they were trying to get across. For a good portion of the attack, the TOW section was leading the attack and didn't know it. They both poked out of the woodline and were killed.

The heavy section finally got turned around and headed back north. They got clear out of that major creek east of it, just on the other side of Tank Trail 11 and were moving right across the open, across that ridgeline and moving right in line, 1, 2, 3.

Where they went south is off the maps, I take it.

Right--they circled back around north and then in the vicinity of 084684. Somewhere from thereabouts. The first tank got hit and the next two tanks continued to move. They moved right up behind them and around dead vehicles. The TOW took them, 1, 2, and 3.

The FO elected to move with the TOWs after he had problems with his vehicle. He never called any fire missions.

No one in the tested unit ever detected an OPFOR vehicle of any kind. Again a couple of controllers indicated that they saw OPFOR vehicles and should have been some observation of TOW 20 and TOW 41 when they engaged the vehicles. The Platoon Leader split his elements. He did not attempt to communicate with them to find out if they were on their route or if they were doing what they were supposed to do. Thus, their movement was not coordinated. Part of the problem was that he was so far south of that mountain that he could not talk to them.

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